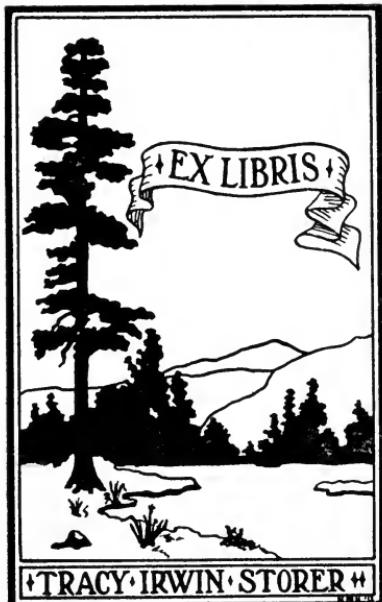


THE STORY OF A BIRD LOVER



W. E. D. SCOTT



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THE STORY OF A BIRD LOVER





A ROOM IN MR. SCOTT'S LABORATORY AT PRINCETON.

Frontispiece

THE
STORY OF A BIRD LOVER

BY

WILLIAM EARL DODGE SCOTT



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THIS STORY IS DEDICATED
TO THE MEMORY OF
LEWIN WETHERED BARRINGER
ONE OF MANY FRIENDS WHO LOVED THE
WOODS AND WATERS OF FLORIDA



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INTRODUCTORY NOTE

It is not merely the fact that the author of this book is recognized by ornithologists as one of the foremost experts in America as regards the life and habits of birds that has led the publishers to urge him to write this biography of a bird lover. Neither is it chiefly the fact that his favorite study has led him into many not well-known parts of the country, where his experiences, personal and scientific, have been curious and interesting. It is rather because Mr. Scott in quite an unusual, perhaps even unique, degree has brought the life of birds nearer to the life of man—has established, so to speak, personal relationships with the whole bird kingdom.

A visit to Princeton, where Mr. Scott occupies the post of Curator of the Department of Ornithology in the University, and a few hours spent with his remarkable collection of live birds, would show clearly what is meant. Here, in a "laboratory" forming part of his own house, are in six rooms about five hundred live birds, native and foreign. No small part of the author's time and all the time of an assistant are spent in caring for these birds and in studying them. The collection has not been made for the ordinary purposes of an aviary,—that is, to teach and please a multitude of visitors,—but is primarily designed for the purpose of conducting investigation that may lead to a better

understanding of birds out-of-doors and the problems which their life presents.

In a recent article Mr. Scott said, "I think that in every community there are enough people interested in out-of-door life to coöperate in a movement to establish a kindly relation with wild creatures." This is the keynote of his work and his life, and it is because the publishers of this book have felt that all the men and women who love nature—bird nature as well as human nature—should know of the growth and causes of this desire to understand the ways and characters of the birds—for birds have individual as well as tribal characteristics—that Mr. Scott has been asked to tell how, step by step, he acquired his knowledge, through observation, out-of-doors exploration, training of the senses, and (but in less degree) through books and tuition.

Mr. Scott is a graduate of Harvard, where he was a pupil of Louis Agassiz. In spite of a lameness which compels him to walk, even in the house, with caution and with the aid of a cane, he has travelled all over the United States, pursuing his study of the life and character of the bird in its out-of-door, natural surroundings. Not one of the least interesting things about his achievement is the fact that a physical impediment which would be considered by many people to be an almost insuperable obstacle in his path as a naturalist, has really turned out to be an advantage and aid. He is the author of numerous scientific papers and of a comprehensive and elaborately printed and illustrated work on birds entitled "Bird Studies." He lays great stress on the principle that sympathy and love of the beautiful are bound to come through a friendship established with any kind of organic life, whether that organic life be a

plant or an animal. Thus, he says: "The moment you establish a friendship with a plant, care for it and minister to its needs, you feel that it is dependent on you, and you have a different attitude toward it altogether; you do not want any one to harm it, and it hurts you even to break off a twig unnecessarily. How much more will this be the case if you establish a relationship with a live bird, or any animal? As soon as you grow fond of a particular dog or horse, you can never kick any dog or abuse any horse; and I think that the human side of this whole study is perhaps its most important part. The study of birds develops every kind of æsthetic sensibility; it is a pleasure and a benefit to see the beauty of their coloring, the grace and ease of their motions, and to hear the sweetness of their song; and when this is awakened in you, the more vital elements of love, sympathy, and helpfulness will naturally follow."

THE PUBLISHERS.

THE STORY OF A BIRD LOVER

CHAPTER I

CHILDHOOD

ONCE upon a time a little boy saw a cat which had just killed a bird in the garden. By the time the boy caught the cat and rescued the remnants of the bird, there was little left but a wing, and this became a child's plaything for a few passing hours. The boy lost the wing, but something remained,—a picture so graphic, that many years afterward, when near manhood, he suddenly realized that the wing he had rescued from the cat long ago was that of the winter wren.

Looking back, this is the first definite impression of a bird that I can recall.

The winter wren is one of the smallest, shyest, and most seclusive of the migrants that visit the region about New York and New Jersey in the spring and fall. Stealthy and mouselike in its habit, it is fond of old stone walls, where it crawls in and out through the crevices, never making long or protracted flights. It is a short, thick-

set little bird, with an abbreviated tail; its colors are charming; blacks and browns and chestnuts are barred in a very effective manner; otherwise there is nothing particularly remarkable or characteristic in its appearance or manner. During the migrations the notes are insignificant, but while mating and nesting the male birds sing constantly, rivalling many songsters more famous.

Brooklyn was little more than a village in 1852, the year when I was born, and all the country back of the City Hall was open, fields and farms; the Heights south of Wall Street ferry sloped down in a green bank to New York Bay, and Bedford and Coney Island were remote points where we went for excursions to the country. It was a village with a volunteer fire department, and no general water or sewer system. There was a public pump in the street nearly opposite where we lived, to which all the neighbors went for water,—a centre of gossip and news.

I said that the winter wren was the first bird that definitely impressed me; but long before that I have a distinct recollection of a lively interest in animals. One day (I could not have been more than four years old, for my father died when I was not quite five) I was called into a bedroom upstairs, where I found my father and mother. My father had taken the corner of the rug which covered the floor and had rolled it up so that one

end of the roll was held in each hand; he told me to watch while he slowly unrolled it. As I looked intently, I saw a mouse, trembling with fear, standing perfectly still for an instant on the corner of the rug, where it had been imprisoned.

Once before this—it seems to me long before—we were at Clifton Springs, New York, when, taking a drive with my father and mother, a red squirrel ran along a stone wall or fence. This at once excited me. My father had a gun, and stepping from the carriage, killed the squirrel, which I was very anxious to get into my hands to look at more closely. He examined it for a moment, and for some reason, not caring to have me handle the dead creature, but still not wishing to disappoint me too much, he took out his knife, cut off the bushy tail, and gave it to me. I know it was a red squirrel because I know exactly how it looked,—the colors, the definite dark stripe on its side,—in fact, the whole scene is clear in my mind. Even the knife I often picture to myself; and only a few years ago I described it to a cousin, much older than I, and asked him if he could recall it. It was large, having a long blade and white bone handle which was stained yellow with age, and the blade had a curious, out-curved point. When I had mentioned it to my cousin, he told me that he remembered per-

fectly such a knife that my father had carried for years.

My father was a graduate of West Point. His family were New Jersey people; my grandfather and great-grandfather had long lived in the town of New Brunswick. The personality of Joseph Warren Scott, my grandfather, is still remembered by some of the older people of New Brunswick, though he has been dead many years. His reputation as a lawyer is not merely local. He was a graduate of Princeton, and a scholar of parts. His Greek Testament I always associate with him. At the installation of Dr. McCosh as president of Princeton in 1868, my grandfather was present, the oldest graduate, representing the class of 1795.

His father, my great-grandfather, was Moses Scott, a surgeon in the Revolutionary army, a member of General Washington's staff and his intimate friend. My grandfather often told me of the first time he saw General Washington. He said he was playing in front of his father's house shortly after the close of the Revolutionary War, and he must have been some ten years old. A gentleman rode up on horseback, unaccompanied, and there being no one else in the street, he asked the boy if he knew whether Dr. Scott was at home. My grandfather answered that he was away on a professional visit, and the gentleman then said, "My boy, go into the house, and if Mrs. Scott is

at home, say that General Washington will do himself the honor of paying his respects to her." Dr. Moses Scott, my great-grandfather, was present in many of the battles of the Revolutionary War, notably the battle of Princeton, where he assisted General Mercer when mortally wounded. For General Joseph Warren, an intimate friend, he named his son Joseph Warren Scott.

Grandfather Scott's place in New Brunswick is about a mile from the station, a little back from the Raritan River; the canal and highway running between that stream and the front of the place. It is a farm of some eighty acres. A picturesque, winding roadway (laid out by my father and always known as the "lane") leads up to the house, which stands at quite an elevation, having an extensive river and champaign view. The farm is known as "Buckleuch." This house was built long before the Revolutionary days, and is a type of the colonial mansion of the time,—a spacious building with hipped roof, the gable ends broken by dormer and fan windows. It is apparently a wooden house, painted white with green blinds. I said *apparently* a wooden house, for the walls are lined and built, inside of the wooden cover, of tiny bricks that were brought from Holland late in 1600 or early in 1700. These bricks are about half as big as the ordinary building brick of to-day. Broad verandas extend along

both sides, the front and entrance of the house being away from the river.

The ground floor of the house is divided by a hall some eighteen feet wide and perhaps forty-five feet long. The office that my grandfather used for his professional work is just to the right as one enters the front door, and there is also a side entrance to this office. His law and reference books are piled on the shelves to-day much as he left them. Very different from similar books of the present time, they are small, and thick in proportion, and their leather covers are black with age. A door at the other end of the hall, opposite the entrance, leads to a wide piazza overlooking the river.

On the same side of the hall with the office is a large parlor, and on the east wall in this parlor hangs my great-grandfather's commission as a member of the Society of the Cincinnati. It seems of sufficient interest to quote here verbatim:—

BE IT KNOWN that Moses Scott, Surgeon General, New Jersey, and Director-General of the Medical Department United States, is a member of the Cincinnati, instituted by the officers of the American Army at the period of Dissolution, as well to commemorate the great events which gave Independence to North America, as for the laudable purpose of inculcating the Duty of laying down in Peace, Arms assumed for public Defence, and of uniting in Acts of brotherly Affection, and Bonds of perpetual Friendship, the members constituting the Same.

IN TESTIMONY WHEREOF, I the President of said Society, here-

unto set my hand at Mount Vernon, in the State of Virginia, this 24th Day of May, in the year of Our Lord One Thousand, Seven hundred and eighty-four, and in the Eighth year of the Independence of the United States.

By Order
KNOX, *Secretary.*

GEORGE WASHINGTON, *President.*

The parchment on which this is written is yellow, and the writing faded with time.

The library faces the parlor on the other side of the hall, both rooms having a view of the river. Back of the library is the dining room, and leading away from it, a wing contains the kitchen and offices. To the left of the doorway a broad, oak stairway ascends by short ranges of easy-rising steps, forming three spacious landings on the way upward. During the Revolutionary War this house was occupied both by the Colonial and British forces. The Hessian soldiery who were quartered here at one time did a very considerable amount of wanton damage. The rail of the stairway is marked with the hacks of their sabres, and the imprint of the muzzles of their muskets is still plainly visible on many of the steps.

As a boy, the halls interested me enormously; they had been papered with such wall paper as I have never seen elsewhere. The entrance hall portrayed a vista of Paris, apparently ranged along the Seine, with ladies and gentlemen promenading the banks, and all the notable buildings,

the Pantheon, Notre Dame, and many more distributed in the scene, the river running in front. But it was when I reached the second story that my childish imagination was exercised. Here the panorama was of a different kind ; it represented scenes in India—the pursuit of deer and various kinds of smaller game, the hunting of the tiger and the lion by the natives, perched on great elephants with magnificent trappings. These views are not duplicated in the wall paper; the scene is continuous, passing from one end of the hall to the other, a panorama rich in color and incident. I had thus in my mind a picture of India, I knew what kind of trees grew there, I knew the clothes people wore and the arms they used while hunting. To-day the same paper hangs in the halls of the old house.

The Chippendale sideboards, the spindle-legged and fiddle-backed chairs, the claw-footed tables and sofas, the four posters and high daddies, the old clock on the stairs with its moon, still stand in their remembered places. All the rooms have great open fireplaces ; and to this day there is no such thing as modern heating apparatus, or plumbing, in the house.

Facing the front door is a mound surrounded by a circular roadway, and here my grandfather had erected a sun-dial, an object of mysterious charm. Beyond this circle, a gateway leads to an

old-fashioned flower and vegetable garden of some five acres. This is surrounded by a high picket fence hidden in a profuse lilac growth. Everything grew there—asparagus, rhubarb, horseradish, the old-fashioned herbs, and an abundant supply of vegetables. The roses, the lilies-of-the-valley, the violets, the lilacs, the peonies, and the stately lines of box which mark the pathways, seemed to me, as I looked upon them recently, the same that I saw, when I walked in the garden with my grandfather.

At "Buckleuch," protection has always been given to the birds; they were subjects of special care to my grandfather, who allowed no one to disturb them. The wood-thrush and robin built their nests in the honeysuckle over the windows. The catbirds and squirrels were equally tame in the garden and woods, and the place fairly thronged with the smaller song-birds. Equal protection was afforded them during the lifetime of my uncle Charles Scott; and my cousin Anthony Dey, the present owner, shows a like solicitude.

Grandmother Cornell's house on Brooklyn Heights was an old-fashioned three-story brick structure with a high peaked roof. It occupied the entire twenty-five feet of a city lot, and the adjoining lot, until recently, was a part of the place. The entrance was on the side of the house in those days, and in the yard was

a large magnolia, while sheltered by the wall was an apricot tree that bore a profusion of fruit every year. The garden back was full of all kinds of hardy flowers, and was laid out in walks bordered with box in the dignified way of the olden time. Inside, the house was of the conventional type associated with the city.

Many things, however, added to the pleasure of the seven grandchildren, about of an age, who played together here; one was a garret, a room under the roof, occupying the whole upper portion of the house, so large that one of our games was what we called playing farming, and each of us had a farm situated in different corners of this room. Here we had toy stables, with tiny wooden horses and wooden men and carts, and all the appurtenances of farming; and in stormy weather we played day after day at this game. There were long wooden steps that led from the garret to a point of the roof, and outside was a spacious observation platform, much such as one finds on every old house in Nantucket to-day. Surrounded by a strong balustrade, this platform afforded a safe place for kite-flying in the spring; it was where we watched the Fourth of July celebrations at night when the fireworks made a fine spectacle, and from here all the waters of the bay, away down to Staten Island, were plainly to be seen.

Once a wonderful ship entered the harbor; it was the *Great Eastern*, then a miracle of naval architecture. On the day of its arrival we were all taken up to this platform to see the coming of this ship and the ceremonies attending its welcome by New York.

The summer before my father died he had removed to Scotch Plains, New Jersey, where he had bought a farm; and that autumn my Uncle John, my mother's brother, came there for sport,—the shooting of game birds,—and though I was not five years old, the woodcock and quail which he brought home from his excursions are realities to me still. The long bill of the woodcock, his large, mild, deerlike eye placed high up on the side of his head, was one of the things that first impressed me; and I never now see the white throat of a quail without recalling the quail as they were taken from my uncle's gamebag so long ago.

Shortly after my father's death my mother returned to Grandmother Cornell's house to live. As my mother's father died long before I was born, I have no recollection of him; but my mother's mother—Grandmother Cornell, as we called her—outlived my mother many years, and died in 1896 at the advanced age of ninety-three years. She was a notable housewife of the old school; and I recall as boy and man the daily

market-going, with her a serious function, very unlike the present-day calls of butchers and grocers at one's house, or the hurried conversation as to one's wants, with these gentry over the telephone. She looked after every detail of her house almost to the end; so that when she died on the 12th of January, the friend who settled up her affairs found that on the 1st of January all of her current expenses had been discharged and settled, leaving only twelve days of her life to be arranged and paid for.

From my grandmother I learned many things. As a child I saw her regular round of yearly household work, each season with its own particular associations — the sweetmeats and preserves that were made up in the summer months, the apple and mince pies at Thanksgiving, the first shad of the spring. All the details of work and all the delicacies appropriate to each season were impressed on my mind because of the fine household economy and good cheer that were due to her careful administration.

In 1861, we made a journey to Europe, then no inconsiderable undertaking, and the chief incentive was the possibility that something might be done by the great surgeons of Europe to mitigate my lameness, which was then of about four years' standing. But before we left America an incident occurred which made a deep impression in

my memory. To a boy of seven the word abolitionist had no meaning; but as I heard it applied to my mother, it seemed a term of opprobrium. The capture and hanging of John Brown, and the discussion of events, were engrossing topics in the household. Still I did not comprehend the situation, for with my toys, a file of lead soldiers and a small jointed doll, I played at hanging John Brown. I had seen all the pictures of the execution in *Harper's Weekly*, and reënacted the drama as nearly as I could.

The gloom when finally the great conflict opened, when a flag at half mast revealed a new method of expression, is among the strongest of my early recollections.

These incidents have been dwelt on not for any intrinsic interest nor as indicative of later tastes, but as serving to show that my perceptive powers were early called into play, and that my visualizing faculty recorded lasting pictures.

Crossing the ocean, one day one of the sailors caught a bird, in the rigging, which had come on board ship, tired and exhausted, seeking refuge. There was an invalid lady, confined to her cabin, which was just opposite ours, she asked to see the bird, and it was brought down alive in the sailor's hand. I had a good look at it. I recall its long, curved bill, its finely barred brown feathers, the frightened look of its eye,

and I know to-day (though I saw it only for a few moments and was not quite ten years old) that it was the Hudsonian curlew.

We stayed a year in England, France, Switzerland, and Germany, visiting the great cities, but I have no definite recollection of any of the birds, nor that I was interested in them. However, the sport of fishing fascinated me, and though I did not catch anything, I fished in a brook and some ponds in England. The brook was near Chester, and the ponds were in one of the "Commons" on the outside of London. For many days, too, one after the other, along the banks of the Seine in Paris, I joined a row of fishing poles held by men in blue cotton blouses, noisy with a lot of gabble I did not understand. As I look back now, the number of fish were in inverse ratio to the sportsmen. I know I did not catch any. I fished also at Schaffhausen, in Switzerland. The details connected with the sport there and in Paris are clear, the kind of bait, and how, in the latter place, the fishermen enveloped it in mud, presumably thinking that, as the mud was washed away, the lure would appear more natural. At Schaffhausen a kind of sow-bug was used, and together with the one on the hook, a handful were thrown into the water in the hope that the fish might pick up (as was ex-

plained to me) the wrong one out of so many right ones; but I did not see any fish caught at Schaffhausen.

After a year we came back to America, and went to live first on Staten Island. I was then about eleven years old, and have a definite recollection of noticing birds there. Two kinds made a deep and lasting picture in my mind, though I did not know their names. Great flocks of birds came to the juniper trees that bordered one side of the place to eat the berries in season, and there were many spotted-breasted thrushes that passed through at certain times of the year. These happenings were in the fall, and were impressed on my mind by the men who were shooting the thrushes. A German pot-hunter showed me a brown thrush, and told me that all the birds that had a yellow lining to their mouths were good to eat. Then he opened the thrush's mouth and I marked the beautiful golden color inside. Another gunner came after the birds that fed on the juniper berries, and shot into the flock, killing a great number. Some of the birds had plain wings, but others were decorated with beautiful sealing-wax appendages to some of the feathers of the wing. These characteristics, together with the soft brown colors and the pointed crests, define them now as cedar birds. Still the fishing interested me on Staten

Island more than the birds did. There was a pond not very far from our house where there were myriads of goldfish. I used to fish there, and caught a good many. They were nearly all small, and most of them were thrown back again; but the fascination of angling was strong upon me.

After living at Staten Island a year, my step-father bought a farm in Washington Valley, in New Jersey, not far from Plainfield. This farm he purchased of a man of means, who had tired of his toy. The farm was acquired practically as it stood, with all the horses, cattle, and cows, and a great many things on it that appealed to me, some peacocks and a pair of domesticated Canada geese. A brook which ran through the place had been dammed, making a large pond of some twenty acres. Here the ducks came in the fall, real wild ducks; and here our tame wild geese were sometimes visited by other wild geese passing over. On the trees that surrounded the pond I watched the hawks, when the leaves were off, perched on the bare limbs. Here again came to visit my mother my Uncle John, a great sportsman, and now I was big enough to go with him, when he did not go too far, to shoot birds—woodcock and quail. One day when we were out walking together he killed a fine hawk that rose from the grass near by. A bird on the ground

in the bushes, rustling in the dry leaves, attracted my attention. It was a small bird. I looked at it very carefully, saw that it had a black head and neck, was black above, had black wings with some white markings, and rather a long tail with some white feathers in it. Its colors underneath were white on the belly and chestnut-brown on the sides. From these memories I know now that it was a cheewink, or towhee.

Because I was delicate, I was much at home, and had private instruction from a governess, and was allowed to be out of doors all the time possible. The brook was my favorite resort. Here I caught many fish, and learned through experience and some help the fundamental principles of fishing. I watched also many of the other creatures that lived along the banks and in the water—turtles, frogs, and snakes.

After I was thirteen years old I went away to a German school in South Brooklyn, kept by two masters named Deghuee and Schmieder. I was at this school for nearly three years, and lived in the house of Mr. Deghuee. Here I had my first systematic teaching, for before this I had been so much of an invalid that my education consisted largely in reading such books as I liked, and a certain amount of disconnected teaching in a number of schools and by different tutors and governesses. Everything save English composition

was studied in German; mathematics, geography, French, and Spanish, all from German text-books, and both at school and at Mr. Deghuee's house German was the language spoken. The exactitude in method and absoluteness of discipline were characteristic.

When I was perhaps rather more than four years old, among my many pets was a water spaniel, "Prince," the first dog-friend I recall. He was a beautiful dog, orange and white in color, with fine silky hair, large expressive eyes, and great general intelligence. I know that he did many tricks. The cats and kittens of my boyhood were many, but from them I cannot select any particular favorite. I became much attached to a common water-turtle, which my brother and I caught while we were on a visit near Perth Amboy. We used it as a draught horse in our plays, having bored small holes through the back of the rim of the shell to attach the harness, a small paper box answering for a cart. We were at Perth Amboy only a few days, and returning from that point to Brooklyn, the turtle was carried in a basket. When we arrived at Wall Street Ferry, and were on the boat, I looked in the basket, the turtle was gone. I knew that it was safe only a little while before, in the street-car, and was so much concerned at the loss that we left the boat and went to look for the turtle. We found him just outside the ferry house

in the roadway, but alas! a cart-wheel had passed over him. My grief was great, and my mother said to me, "You could not cry more for any of us!"

While at the farm I reared a crow, which was a source of great amusement, not only to me, but to our many friends. This bird was allowed large liberty, was very tame, and with the traditional crow propensity for mischief, played many pranks, both edifying and provoking, and some of them almost inconceivable. He would pick a rose from the garden, bring it to the steps of the piazza, and then carefully remove each petal, laying them in a pile. After this was finished, one by one he would carefully remove each leaf to the step below, making a new heap there. There were three steps to this piazza, and for hours he would move his rose-leaves from one step to another, up and down, seeming to find infinite satisfaction in the process. The whole was accompanied by much gabble, doubtless in crow language, which seemed to me to indicate at times great pleasure, and at other times rage and irritation, when the wind would disturb his pile of leaves and he had to restore order from chaos. Certainly he was a droll, amusing fellow.

Two pairs of tame mice were not so edifying to the family as they were to me, and became so

great a nuisance, their numbers having been largely increased by several litters of young, that the whole lot were summarily dealt with. My brother and I also had rabbits, and the breeding and rearing of young ones was a serious, entertaining, and pleasant occupation to us.

CHAPTER II

YOUTH

AFTER leaving the academy in Brooklyn, I spent almost a year at a boarding school in Providence, Rhode Island. This seminary is known as the Friends' School; and at the time I went there, Albert Smiley was the head-master. In all the schools I had attended so far, including this one at Providence, there was nothing in the line of nature study: no physiology, no botany, no zoology, so that my training in any of these lines, or the development of taste for natural history, does not seem to have been dependent on any inspiration acquired from my school life.

The fall when I went to Providence, the gorgeous coloring of the maple trees and some of the autumn wild-flowers attracted me. I had now become familiar with a few of the commoner birds of the eastern part of America — the robin, the bluebird, the meadow-lark, the yellowbird, the barn-swallow, and the catbird.

My summer vacations were spent at my mother's home, which was now in Plainfield, New Jersey. Most of the time I was out of doors.

One vacation was passed in New Hampshire on the edge of the White Mountains, and that fall I stayed for a short season at Northampton, Massachusetts, with some friends, and worked for a little while in an office to see if my taste lay in mercantile directions. Thus far, though my bent was apparent, it was not very definite or decided. After a few weeks here — not more than five — I was suddenly called home, as my mother had determined that my brother and I should go to an institution which was about to be inaugurated. A wise and far-seeing man in New York had planned and endowed a seat of learning, and his memorable words have become its motto: "I would found an institution where any person can find instruction in any study."

This was Ezra Cornell, the founder of the great university which bears his name.

So my brother and I started, almost at once, for Ithaca, and, passing an easy examination, were admitted as freshmen to the first class of Cornell University.

I hardly realized myself what it all meant; but I soon began to know that here an effort was being made to develop the great idea laid down by the founder. The buildings at Cornell University in the beginning were four in number. There was a dormitory on Cascadilla Creek, known as The Cascadilla, and then crossing on

a rude bridge, some quarter of a mile or more beyond, one came to three more buildings—a central one and two smaller stone structures, one on either side, the whole facing the lake, and overlooking a remarkable panorama of beauty.

Very soon my studies drew me under the influence of Professor Burt G. Wilder. He had been a pupil of Agassiz, and had graduated with great honor at Harvard University. My work with him began as a student in a class in physiology. As the subject developed, I was fascinated, and felt in a degree the value of my opportunity.

Dr. Wilder as a teacher had a great influence on everything I have since done in a scientific way, though I was with him but a short time. A physiologist and anatomist, he had also a very considerable knowledge of general natural history, and he encouraged every effort I made in that direction. Such inspiration was extended to all his students.

I began to learn much about insects, particularly butterflies and beetles. There were then no classes in special branches of zoology, but my attention being arrested, I would go to Dr. Wilder with my problems, and with his help in this way I pursued work outside of my regular college studies.

Up to this time I had shot but few birds in my life—perhaps one or two. One afternoon that

first fall in Ithaca, I borrowed a gun of some one and went up Cascadilla Creek. After a little I came upon a belted kingfisher sitting on a dead limb overhanging the bank of a mill pond. I tried my best to get near him, but he was shy and wary, and anticipated every effort I made to approach him. Finally, however, he flew up toward the head of the pond. I hid myself on the bank, and presently he came flying by not very far away. Fearing I might not get another chance, I fired at him as he passed. I could not see that I had hit him, for he pursued his course quietly to a branch of a tree, some two hundred feet away, near where I had first seen him. Here he gave his characteristic "rattle" as he alighted. I watched him for a moment and saw him reel like a drunken man, and then fall from the limb and strike the ground just at the edge of the water. The watchman of the stream was dead.

I went to him and took him in my hand; and though he was stone-dead, there was not a mark or sign of a wound anywhere; not a drop of blood soiled his feathers, nor was there any apparent about his mouth; there was nothing to show in any way the catastrophe that had overtaken him. The whole thing was to me a marvel. I recall the shock now. What had I done? Was it possible to frighten a wild bird to death?

I have seen the same thing happen many times

since; that is, a bird in full flight being fired at and apparently missed will pursue his way without a motion to indicate the fatal wound, and then, after going a greater or less distance, suddenly fall dead to the ground, frequently from mid-air. I know now the reason for this. A single shot striking a bird in flight, penetrating the thin side of his body and entering his lungs, makes a very small hole and no external hemorrhage ensues. There is little or no shock to the bird; I fancy he hardly feels pain, but presently the internal hemorrhage from the great blood-vessels that have been severed makes him suddenly unconscious, and in a moment he is dead. The time, however, between the penetrating of the shot and the internal hemorrhage is sufficient to allow the animal to travel a very considerable distance, seemingly uninjured.

Kingfishers, with the characteristic note I have referred to, are always associated in my mind with the gentry who tradition says patrolled the streets and byways of towns and villages, giving warning of danger with a machine sounding not unlike the "rattle" of the kingfisher.

Well, I had my kingfisher and I wanted to keep him, but the question in my mind was how to do it. Birds could be stuffed, because I had seen preserved birds at that time, but I knew of no one who could show me the process. Though there were

doubtless books on the subject, none were available. However, I spoke to Dr. Wilder about it, and told him I wanted to preserve the kingfisher. He said that he had recently read of a naturalist who had made an expedition into some very remote part of China, and brought back many bird skins. He simply skinned them, as he would any animal, opening them from the vent to the angle of the bill, laying the skin out flat, sprinkling it with salt or alum, and drying it between sheets of paper. All his specimens came home in that shape, and were utilized for scientific purposes afterward. So, with a knife, I proceeded to treat my kingfisher in that way, and was so far successful that a flat skin of the kingfisher, retaining most of the feathers, not much rumpled and fairly clean, was the result. In a few days it dried, and having duly labelled it, I was delighted with my specimen.

Later in the year I made the acquaintance of a boy who told me that another fellow in college, by name Jobs, from somewhere out West, knew how to stuff birds. I found out where Jobs roomed, and called on him. He had on his mantelpiece a mounted specimen of a spotted sandpiper. It appeared to me the most beautiful and natural piece of work conceivable, and I determined at that moment to become capable in this kind of handicraft. Jobs told me all about it, and showed

me as best he could, but he did not have any specimen to demonstrate with, and for some reason I never had a lesson from him.

My ambition was nevertheless formed, and to goad it on, just at that time a gentleman presented to Cornell University the first systematic collection of mounted birds that the museum of that institution acquired.

Green Smith, Esq., a son of the well-known Gerrit Smith, was a gentleman of leisure, a good sportsman, and had a keen interest in birds. During his many extended hunting trips he had always collected specimens. His collection, for the time, was remarkable. Many of his birds had been mounted by John G. Bell, a very famous taxidermist, a contemporary and friend of Audubon. Bell had been in the field with that great pioneer in American ornithology, and had assisted him in his collecting. Green Smith's scientific knowledge of birds was not profound; I think his interest in them was largely that of a sportsman. They also aroused his æsthetic sensibility, always the first appeal of nature.

Shortly after I met him in the early spring, one day I killed a little bird that was a dark olive-green with more or less definite bars on each wing, and with a bright orange crown surrounded by a golden area, practically concealed by the general olive-green feathers of the head.

I had no idea what it was, and took it to Mr. Smith for information. He, with an old colored man who served as an assistant, was arranging the birds in the cases which the university had provided to receive them. I handed him my bird, he examined it, said he was not sure of its identity, but that he would look it up, and took down a book from the shelf. This book was Cuvier's celebrated "Règne Animal," the volume devoted to ornithology, and here he found the plate of a bird that looked something like the little fellow we were discussing. He told me he thought it must be Cuvier's kinglet. I am elaborating all this here, not so much for the interest of the thing in itself, as to let some of my younger friends know what was the state of knowledge in general about birds at so late a date as 1868 and 1869 in this country, even among people who were professed students. The status of Cuvier's kinglet is too well known to be dwelt on here, but I quote the sum of our present knowledge regarding the bird.

CUVIER'S KINGLET.

Regulus cuvierii Aud.

Regulus cuvierii Aud. Orn. Biog. 1. 1832, p. 288, pl. 55.

"Known only from Audubon's description and figure of the original specimen, killed in June, 1812, on the banks of the Schuylkill River, in Pennsylvania."

American Ornithologists Union "Check-list" of North American Birds. p. 333, Hypothetical List. Second and Revised Edition, New York, 1895.

Only one specimen of Cuvier's kinglet has ever been taken, so far as naturalists are aware, and this was obtained by Audubon on the banks of the Schuylkill in June, 1812.

I may say that Mr. Smith's knowledge of large birds, and especially of game-birds,—ducks, snipe, and birds of prey,—was accurate and adequate; but when it came to the smaller insectivorous song-birds, it is evident, from what I have just recounted, that his knowledge was at that time elementary.

I know now that the little bird was the golden-crowned kinglet, one of the most abundant migrants, and a frequent winter resident in all the country in the vicinity of New York and southward throughout eastern North America, going even as far south as Central America in that season.

From this period, the study of insects and birds divided my interest. I acquired a very fair knowledge of the common butterflies and beetles of the region about Ithaca. Having Harris's "Insects Injurious to Vegetation" as a text-book, I was able to identify the commoner insects that came in my way. While much interested in birds, it had not even occurred to me that their

study would engross so much of my attention and time later.

A very pleasant and profitable year was spent at Cornell University. During that term I heard university lectures delivered by Louis Agassiz, James Russell Lowell, Bayard Taylor, Goldwin Smith, and other notable men. I made the acquaintance of Mr. Cornell in a slight way, and also of the president of the new university, Andrew Dickson White. I came to know the librarian of the university, Willard Fiske, quite intimately, and through him his fast friend, Bayard Taylor.

Dr. Wilson, one of the professors of the university, had a son with similar tastes to mine, though I think they lay more in the direction of sportmanship. However, he had one thing I did not have, a light double-barrelled gun, and I used to go with him whenever I had the opportunity, and prepared birds whenever he could spare specimens which he had killed. After a little, it came to be known that I was interested in that sort of thing, and the boys helped me all they could. I may say that during these years I was very lame, often having to resort to crutches.

During the next summer vacation my mother was away from her home, in Maine, and I spent nearly two months on a farm that belonged to an uncle.

Long before this the farm in Washington Valley had been sold, but curiously enough this farm where I spent the summer was not only in Washington Valley, but adjoined the place I knew best in my childhood. Here I began to renew my acquaintance with the country I had not been in for several years. I tramped up and down the old brook, saw the spotted sandpipers and green herons, became acquainted with the wood-thrushes and catbirds, tried in vain to see the whippoorwills, which I heard singing every night, and saw besides many birds I did not know, but which nevertheless made a lasting impression upon me.

Uncle Dick did not like boys to shoot anything in the way of song-birds, and so these were undisturbed; but he let me have his gun, and I was allowed—if I could get near enough—to kill spotted sandpipers and green herons or crows. During these hunting trips I saw many things.

At this time my interest was concentrated upon the accumulation of a collection. I wanted the things so that I could look at them at my leisure and convenience, and see and study them whenever so disposed, also to satisfy my æsthetic craving. But even then I believe I did not care for a collection for the sake and glory of owning it; it was simply because I wanted the things available.

After about six weeks spent here I joined my mother at Old Orchard Beach on the Maine coast. On the edge of the ocean were countless sand-pipers, gulls, and other water-birds never seen before and unknown to me, and I formed the acquaintance of that cosmopolite, the sanderling.

Walking up the beach one day, I found the half-rotted carcass of a fish that had been thrown ashore. It was a monster over six feet long, so far disintegrated that the skeleton was the chief part left. Fishermen told me it was a "horse mackerel." Notwithstanding that the bones were full of oil and grease, and that it was disagreeable and malodorous and not particularly pleasing in appearance, it was too great a treasure to leave behind. I brought back most of the vertebræ and the skull and many of the small bones in a bundle, much to the distress of my mother, both during our stay at the hotel and on the return journey home.

My taste must have become now so definitely apparent that my parents remarked it, for my mother stopped with me in Boston on our way back from Old Orchard Beach to consult with Dr. Wilder there as to my future. Whatever consultation she had with him resulted in her determination that I should have the best opportunity obtainable for the kind of study that appealed to me. The same fall she leased a house in Cam-

bridge, and I worked under one of the great masters, the most inspiring teacher of nature that the world has known.

The house in Cambridge where we lived this year was not distant from the museum, and was surrounded by an open field, where numerous trees were scattered about, the whole attractive to birds.

For the coming year I studied under the direction of Louis Agassiz, with Professor N. S. Shaler, Dr. Jeffries Wyman, and Mr. J. A. Allen, who was then Curator of Birds and Mammals in the Museum of Comparative Zoology.

Nominally a student in the Lawrence Scientific School, a department of Harvard University, I was really a special student working almost entirely in the direction of natural history.

One of the first things I did on going to Cambridge was to find out what local laws there were that would allow me to pursue the collecting of birds. By that time my mind was made up that this was the work I wanted to do more than anything else. Having ascertained that it was necessary to apply to the mayor of the city of Cambridge for a permit to shoot birds, I made application, and received a document setting forth that such a privilege was granted to me. Hence I was enabled to collect all kinds of birds at any season of the year. None of this work was done

during my regular hours in the museum, but all the leisure I could get and all my holidays were spent with my gun (for I had a gun of my own by this time) in collecting such birds as could be obtained in the vicinity of Cambridge, working over practically much the same ground that had been covered by the great naturalist, Nuttall.

So the term at Harvard wore on, and the first college year of 1869 and 1870 came to a close.

CHAPTER III

STUDENT DAYS

My first college vacation after going to Harvard was spent at my mother's house in Plainfield, New Jersey, on the outskirts of the town. I was in Plainfield early in June, and made a very considerable collection during the holidays. This was composed chiefly of the local birds breeding in the region, and now, as I became acquainted with them, the list of known kinds grew rapidly. Wilson's thrush, the brown thrasher, the house-wren, the scarlet tanager, the rose-breasted grosbeak, the yellow-breasted chat, the orchard oriole, the Baltimore oriole, the blue-winged yellow warbler, and the yellow warbler were noticeable, most of them common, and new to me. The scarlet tanager and the yellow-breasted chat particularly struck me,—one a gorgeous, fiery spot among the fresh new green of the oak leaves, and the other a voice, the owner of which remained long unknown. This voice came from various tangles and dense thickets. It began with a croak, and then followed a sort of whoop; now a sharp whistle succeeded by a rapid series of short

whistling notes, staccato and diminuendo, with longer intervals toward the close. Again the noise was like the mewing of cats, and sometimes a young puppy seemed concealed in the bushes. The whole thing puzzled me. The vocabulary of the chat is not limited; the bird is a polyglot and vociferous.

Once, on a very still day, about noon, when nature was silent,—no songster caroled and hardly a zephyr stirred,—I saw a bird rise from a dense thicket and begin a curious flight, like that of some butterfly or large moth, and as seemingly inconsequent. With dangling legs and slowly fluttering wings, with feathers apparently awry, he poised for a moment, and then burst into the series of notes that had so long confounded me; the croak, the whoop, and the sharp whistling notes that I have tried to describe, and in addition many other drolleries, both of song and motion, were executed. A most remarkable performance! When he alighted again a momentary view disclosed a bird about seven and a half inches long. All the upper parts and the wings were olive-green. This color was interrupted on the sides of the face by a clear white line extending from the nostril to the back of the eye, and the region in front of the eye was almost black, while about it was a white ring. The whole throat and the body under the chest was a clear lemon yellow, deepening

almost to cadmium. The under parts were white shading into grayish on the sides and flanks. Such was this new acquaintance, the yellow-breasted chat, a bird that comes from the South in April, and reaches as far north commonly as Connecticut and southern Minnesota, retiring again in the late summer, spending the winter in Central and northern South America.

Aside from all I have said about the chat, I am struck by what appears to me an unusual matter in regard to his immigration and emigration. Most of our small birds of passage that are common in eastern North America proceed southward, following the land. Ultimately they reach Florida, and passing down that peninsula, thence cross to Cuba, Jamaica, and by this island route finally reach their winter home, whether it be among these islands or in South America.

Now, I have spent many winters in Florida, and many falls and springs. I have seen all the common migrants as they passed: the scarlet tanagers, many kinds of warblers, the swallows, wrens, rose-breasted grosbeaks, the bobolinks, the orchard and Baltimore orioles; but I have not seen, nor have I met any one else who has seen, a yellow-breasted chat in Florida. It is common throughout parts of Georgia and the Carolinas, both as a migrant and as a resident breeding bird. I conclude that the yellow-breasted chats pursue a

route coincident with the land areas, and that those which occupy that portion of lowland North America which is east of the Appalachian chain during the breeding season, pass south when migrating to the east of that chain and proceed around its southern point; taking a land journey across the Mississippi, they reach Central and South America (where they winter) by what may be termed the Louisiana, Texas, and Mexican route. It seems not a little remarkable that this bird presumably has never taken the Florida and island route followed by so many other small migrants, nor am I aware of any West Indian records of the species in question.

I cannot dwell longer on the work of this summer, but must hasten on. Suffice to say that I collected about two hundred birds, some of which I did not know until I returned to Cambridge, where, with the assistance of the museum collections, their identity was revealed.

The house that we went to live in, and where the rest of my undergraduate years were passed, was located in Berkeley Street, and was almost directly back of the poet Longfellow's; his garden adjoined our place. John Fiske was a close neighbor and nearly opposite was the home of William Dean Howells.

My mother had a considerable circle of friends which grew rapidly. Robert Dale Owen, Henry

James, the elder, and others were frequent callers. Samuel Longfellow, the poet's brother, also came, and the social circle was both charming and cultivated.

To return to my college work, Mr. J. A. Allen had recently made a tour of parts of Kansas, Colorado, and Wyoming, principally for the purpose of obtaining ornithological material. The collections that he had so made were in the neighborhood of fifteen hundred birds, and had just arrived at the museum. Part of my regular work during this year was the study of these collections, and I became conversant, at least, with the external appearance of the specimens in the bird fauna in question. In 1878 I visited almost the same region where Mr. Allen had worked, and met no birds that were not recognized at sight, so careful and thorough was the kind of training pursued under Mr. Allen's direction.

I kept up my out-of-door study and field-work. One of my favorite rounds for such investigation was a place we called "The Farm." It was just back of Mount Auburn, and among its features was a large apple-orchard, and a considerable pine wood, while in the more open land was a large field of asparagus which was allowed to go to seed. To these asparagus beds many birds came in the fall and winter, among them great flocks of cedar-birds, to feast on the berries. The passenger-

pigeon, once a remarkable member of the bird life of eastern North America, still bred in small numbers in the pine woods. Jays and flickers roamed through the orchard almost the entire year.

One day in the fall, I had just killed a blue jay from a tree in the orchard, when I saw a young man coming toward me, who hailed me. He, too, had a gun. We had some conversation, and I perceived directly that we had mutual tastes. I told him my name, and he said at once, "You are the boy who applied for the permit; we were wondering who it was." Then I learned that he was Henry Henshaw, and that he lived in Grantville. He also told me that a friend of his, William Brewster of Cambridge, another young man, had a very considerable collection of birds, and invited me to go with him to see it. We made an appointment to do this at an early day.

One afternoon we called on Brewster, and our meetings after that were frequent. The group was soon joined by Ruthven Dean who lived a little way from Brewster. After a while we set apart a certain night in the week when we met, sometimes at this one's house, again at that one's, to discuss birds, and this went on all through the year, until toward the close of it we began to speak of ourselves as the "Bird Club." The next fall our numbers were augmented by Henry A. Purdie

of West Newton, Ernest Ingersoll, C. J. Maynard, and a few others, and then we definitely formed a club for the study of birds, which met weekly at William Brewster's house. We called it "The Nuttall Ornithological Club" after the eminent ornithologist. The club still exists in Cambridge, and is the parent of the American Ornithologists' Union.

This college year passed much as the one before, except that my knowledge of birds had become wider. The material obtained in Plainfield gave me duplicates so that I could exchange with both Henshaw and Brewster, who had small collections of bird skins.

In the next vacation a great delight awaited me. A school friend of my mother had married William H. Edwards, a naturalist, who was particularly interested in insects and more especially in butterflies. My mother had kept up a rather desultory correspondence with her friend, and in an interchange of letters in the spring, an invitation was extended to me to visit the family and spend the coming vacation at their home. They had formerly lived at Newburgh, on the Hudson, and I had been there once; but after the Civil War Mr. Edwards became engaged in coal-mining in West Virginia, and removed to the Kanawha Valley, locating at the town of Coalburg, where he had extensive mines which were being worked,

and which needed his constant attention. He had a son and two daughters about my own age.

So I began to equip myself for my first real expedition as a naturalist. It was only a small stock of powder, some dust-shot, a few pounds of arsenic, some cotton, needles and thread, note-books, and my tools that went with me, but I shall never forget the preparation. Many times since I have fitted myself for prolonged stays in the wilderness, with stores, provisions, and equipments of various kinds, most elaborate and bulky, but I look back to the day when I spent my few dollars for the things I have described for my trip to West Virginia, and feel again the joy and anticipation which no subsequent preparation has awakened.

I went by rail to Baltimore, thence via Harper's Ferry to Parkersburg on the Ohio River, and by steamboat on this river to a town near the mouth of the Kanawha, called Gallipolis, where another boat conveyed me up the Kanawha River to Coalburg. This was a roundabout journey, and the boat part of it exceedingly slow. On the way I saw several birds never met with alive, and two of them I observed particularly. The first was the red-headed woodpecker, conspicuous from his definite markings exhibited in flight, and the other the turkey-buzzard, at which I never ceased to wonder, as it soared with so much ease, or passed the trains as if they were stationary.

I was received with the kindest welcome at Coalburg, then a remote place where they saw few people from the North.

Coalburg is situated in the valley of the Kanawha River, which is here narrow with high hills on either side. The river is about a quarter of a mile wide generally, winding in and out among hills. These rise abruptly just back from the river, there being little bottom-land. At the time I visited this region they were heavily timbered with a growth of poplar, beech, oak, and some chestnut, though beech was one of the most noticeable of the forest trees. Small streams flowed down at frequent intervals from the high hills above, which formed a spur of the Alleghany Range. They can hardly be called mountains, as they attain a height of not more than seven hundred feet above the level of the river. From my paper published in 1872 I quote the following sentences:—

“This elevation, however, is great enough to make a very decided variation in the temperature and surrounding conditions from those of the valley, and hence affords some interesting facts relative to the local distribution of the species through the same area of country. The birds of the Alleghanian fauna generally are found on the mountain sides and tops, and those of the Carolinian fauna in the valleys. Of course, in so small an area, birds of both the above-mentioned faunæ were found in either of the localities, but the above seems to be the general rule.”

In subsequent parts of this narrative I shall have to tell something of the geographical distribution of North American birds, and I call attention to these few short sentences as indicative of generalizations that will be developed.

Just above Coalburg an island divided the river. This island was heavily wooded, and there was a very dense and tangled undergrowth — a great resort for birds. At places along the river, though the banks were generally high as well as abrupt and steep, there were small beaches of shingle, and here I made the acquaintance of the large-billed water-thrush. When I first saw the water-thrushes at some little distance, they seemed to be some kind of sandpiper with which I was not acquainted. There was the same tilting motion, the same rapid running followed by a pause and tilt characteristic of the whole group of sandpipers, and emphasized in our fresh-water species. All the habits of these water-thrushes impressed me as sandpiper-like; and here it may be well to call attention to a fact that has always seemed to me of particular interest in the group which we call song-birds. The matter referred to is the reversion to ancestral habits and methods of life among this kind of perching birds.

Though ornithologists disagree as to details, some assigning one family and others another as the highest in rank, they all agree that the

group of song-birds represents the summit of development in bird life. For instance, the family of thrushes is believed by some to be at the pinnacle, and others assign that place to the family of crows, but there is no difference in opinion as to the entire group-position.

Now, throughout the sub-order of song-birds there crop out habits which indicate at least a likeness to ancestral forms. I have mentioned the case of the water-thrush. Here is a bird near the summit in the scale of development of bird life, an example of a high type of bird structure, whose powers of song are among the best of his kind, but whose habits are aquatic, and whose very motions suggest at once an affinity with a very distant family — the sandpipers.

Again, one cannot see a nuthatch climbing a tree without referring him to the order of wood-peckers (*Picidæ*), and yet he too is high in the list of song-birds. Who has ever seen a shrike or butcher-bird kill a small bird or mouse and not thought of hawklike habits; and the water-ouzel, common in the streams of Colorado and the Sierras, while near to the family of thrushes, is as truly aquatic in its habits as are the ducks. John Muir, on page 277 of his book "The Mountains of California" in his charming account, has given us so vivid a picture of the life and beauty of this little creature that I fear to dwell on it.

Suffice to say that no duck or grebe, no penguin or petrel, more fully enjoys, or has a more intimate acquaintance with the mysteries of water than this thrush. Swimming and diving for its food, with its nest built under some brawling fall on a mountain stream, and never away from the water, it is as eminently a water-bird as can be conceived, yet, perched on some wet stone protruding out of the rushing mountain stream, it pours forth a song which rivals that of any of its compeers—the nightingale or the shamah. Without question their ancestry is indicated in many of our song-birds.

My first impression of Coalburg was of the birds. As we walked to the house from the landing—only a few steps—I saw a colony of purple martins which occupied a cote in the yard where the residence stood. Swallows do not sing much, and their twitter is heard only by giving close attention. The purple martin, largest of all our American swallows, would be remarkable if only for the beautiful polished color of his royal coat. Added to this his great affection for his kind (manifest in colonies where many pairs associate), the loud, joyous warble of mating and breeding time, the grace of flight and the beauty of form, combine to make the martin one of the most desirable birds about a country place.

Martins are curious birds in disposition, rather

erratic in their choice of breeding grounds, fond of the vicinity of man, and interesting to a degree. Hardly an isolated house in the South, whether mansion or hovel, but has its colony of them. These birds breed as far north as Connecticut, and even Massachusetts, but only very locally, and they are almost unknown in many areas. In the South, a pole erected in a yard and hung with some calabash gourds, having a round hole for entrance, will always attract them, but in the North like efforts seem in vain. Formerly they were common in New Jersey, but now are rarely seen, except locally and as migrants. The English sparrow is largely responsible for the exodus of the martin. Both birds fancy the same sort of nesting sites, but the sparrow being a resident in the land, and the martin a migrant, probably the resident has taken advantage of the old tradition that "possession is nine points of the law." Alas for the former tenants of our bird-houses with their gay song and lovely color!

During my stay in Coalburg, which was a most agreeable one, a collection of some five hundred birds was secured which represented eighty-six species, many of which I had never seen before. The blue-gray gnatcatcher, the Carolina chickadee, the tufted titmouse, Carolina wren, worm-eating warbler, the cerulean warbler, the yellow-throated warbler, the large-billed water-thrush,

the Kentucky warbler, the hooded warbler, the summer tanager, the rough-winged swallow, the cardinal, the Acadian flycatcher, the pileated woodpecker, red-headed woodpecker, the least bittern, and the little blue heron were some of the birds that I had known only by reputation.

Another remembrance of the time is the pleasure of my association with Mr. Edwards and the other members of his family. Mr. Edwards was a man widely known as a specialist in butterflies, and here, this study was pursued with vigor. He taught me about all the common butterflies of the region; showed me how they grew, what their development was, what they fed on. His method of procuring specimens for his collection I shall always recall. It seemed so original and new to me. He avoided as far as possible catching butterflies in the ordinary way, and the net was employed only for unusual kinds. Procuring a male and female of a given species, and covering the plant or bush on which the young caterpillars would naturally feed with a barrel netted at one end with mosquito netting, he introduced the captives alive to such a retreat. They would lay the eggs and soon after young caterpillars would be hatched. Feeding on their natural food, protected from the wily ichneumon flies and other enemies, the caterpillars in due time changed into chrysalids. Ultimately from

these chrysalids were obtained perfect specimens with not a scale displaced and not a mark to deface them. Mr. Edwards's son shared with me my interest in the birds, and we collected together. The summer wore away with many pleasant occupations.

One of the first things I did on arriving in Cambridge was to show my collections to Mr. Allen; he seemed much impressed by them, for they included many birds that we knew but little about at that time. He drew me out on the subject of the summer's work, found what kind of notes had been made, and asked me to elaborate them. This I did, and formulated the results when I was twenty years old in a paper read before the Boston Society of Natural History, and published as a part of the proceedings of their society in October, 1872. It was entitled "Partial List of the Summer Birds of Kanawha County, West Virginia." The paper in question is what is technically known as a faunal list, and in 1872 few lists of this character had gone to press in this country, though now their number is legion. This was my first original contribution to science, and the initial paper published by any member of the Nuttall Ornithological Club, for at this time the club had not issued a proceeding of its own, the first bulletin of the Nuttall Club appearing several years later. The mem-

bers of the club always found some medium for their contributions. *Forest and Stream* and other journals were available for such publications. The readers of this book are referred to the second volume of the Bulletin of the Nuttall Club for a more detailed account of the society.

Now began my last year as an undergraduate student at Cambridge. My study was much outside of books. It was not conventional. Many of us still concur in the belief that all knowledge is to be gained through print. Perhaps this was the point of view of my mother. At any rate, so far as I can remember, the only real anxiety I caused her was as a student. A student outside of books was an anomaly, and there are many yet who fail to read the simplest stories that are told out of doors, and not printed in the orthodox way. Throughout the entire year my mother feared I would not get a degree, because in order to do so I had naturally to pass a difficult examination, and also to prepare a thesis. That instead of applying myself in the conventional way, every moment I could snatch from what was absolutely necessary to be done inside was spent in the fields, was to her a source of worry. Thus it went on until within a few days of graduation. When I came home the morning after my final examination, knowing the result, and told her that I not only would graduate, but with some degree of

honor, her relief was great. As a matter of fact, on the day when the final Commencement exercises culminated, with the presentation of degrees to the men who graduated at Harvard University in 1873, my friends told me that when President Eliot read my name, he added the words, "In Absentia." I was away in the woods studying birds.

During the last two months of this college year a plan had developed for an innovation of an educational nature. The idea originated with Professor N. S. Shaler. He wished to establish a summer school for the study of natural history somewhere on the Massachusetts coast, and I think had chosen Nantucket or Muskeget Island as a base of operations. Professor Louis Agassiz, returning about that time from a trip to South America, and hearing of the project, indorsed it heartily, discussed it at length with his many friends, with the ultimate result that he was offered the privilege of occupying an island known as "Penikese," in Buzzard's Bay, one of the Elizabeth group. This belonged to a gentleman named John Anderson, and he not only granted the free use of the island, but aided substantially in the erection of buildings for the proposed school. In addition a very fine schooner yacht was given by another friend for dredging and fishing purposes. Letters sent out to the different colleges, normal

and other schools, throughout the United States received hearty response, and an unusual body of students — many of them gray-haired teachers — men and women, assembled at New Bedford one morning late in June, preparatory to embarking for the island, distant some fourteen or fifteen miles down the bay.

The story of Penikese is too well known for me to dwell on it here. The notable opening of the school is not only historic, but has afforded a theme for one of our poets. Among the teaching staff were Louis Agassiz, Burt G. Wilder, Edward S. Morse, B. Waterhouse Hawkins, Alfred Mayer, the physicist, and Count Pourtales, who had charge of the dredging.

My first impressions of Penikese were naturally of the bird life of the island. As we approached it that day, myriads of terns rose from their breeding grounds. They were birds with which I had but little acquaintance. Two kinds were represented, the common tern and the roseate tern. The latter, though present in great numbers, were much less abundant than the former. Besides the terns were many of the commoner land-birds of Massachusetts, notably meadow-larks, barn-swallows, a number of sparrows, such as the yellow-winged and song sparrows, robins and blackbirds.

At Penikese I made the acquaintance of Mr. H. H. Straight and his wife, who were teachers

in a normal school in western Missouri. Mr. Straight was most enthusiastic both as a teacher and as a student. There, too, was the principal of the same school, James Johonnot, and his daughter. Among the students were Ernest Ingersoll, Professor C. O. Whitman, then an almost unknown man, Walter Faxon, Charles S. Minot, J. W. Fewkes, Winifred Stearns, David S. Jordan, and others who have since become notable in one of several fields as naturalists.

I returned to Cambridge in the fall. No professional opening presenting itself, my studies were again taken up while awaiting and looking for a position.

Some time late in November a great gale raged on the coast of Massachusetts. The next morning when we visited Fresh Pond, as we often did to see what migrant ducks or birds might have come in there, we found the whole place covered with myriads of little water-birds, which we knew were some kind of strangers from the North. They rested on the surface of the water in incredible numbers, and many sat along the shore. I walked up to a group and took one of them in my hand, for the birds were exhausted, utterly tired out, and seemed bewildered. He was a dumpy creature, seven or eight inches long, with very short neck, a head large in proportion to the body, and black and white in color, with almost no tail. Webbed

feet were a part of his equipment. We took several home, and found on the way back that these birds were represented in great numbers all along the Charles River, and that many had been caught in the streets early in the morning. The gale had driven in and imprisoned these strangers in a place where they had scarcely ever been seen before.

We readily learned that the species was the little auk, or dovekie, a common arctic bird, breeding on the coast of Greenland and further north in countless numbers, wintering as far south as the coast of Long Island and New Jersey, but keeping well out to sea.

The name of the genus to which this bird was then attributed was *Mergulus*. That afternoon I took a pair of them with me to the laboratory of Dr. Jeffries Wyman where I was about to do some work and attend a lecture. I showed the birds to Dr. Wyman, who was much interested in my account of their advent, and proceeded to give him what I supposed was the scientific name.

Now, there is a genus of birds with which are associated most of our common sheldrakes, or saw-billed ducks, which is known as *Mergus*, a name similar to that mentioned a few lines above. Wishing to display my newly acquired knowledge before Dr. Wyman, I called the bird *Mergus alle*

instead of *Mergulus alle* which was its proper name at that time. I knew Dr. Wyman as a comparative anatomist, but he was never associated in my mind as a systematic naturalist, and I did not know that he had a great knowledge of birds, but, without referring to a book, and by merely glancing at the birds, he said at once, "You have made a little error; the genus of these birds is *Mergulus* not *Mergus*." This may seem a trifling incident, but I tell it because it strongly impressed me at the time, and is only one of many varied recollections that have given me a growing respect as the years go by, for the great attainments, the singleness of purpose, the patience, and withal the greatness, of Dr. Jeffries Wyman. I think perhaps no man in Cambridge, save Mr. Allen, did more to aid me on the road I have travelled.

Of course Dr. Asa Grey, with whom I did some botanical study, has always been a great inspiration to all his students, — but primarily my interest did not lie so much in the direction of botany, and for this reason my work in that field was limited, to be regretted later.

The committee who conducted my oral examination for graduation at Cambridge, which was the concluding function after my thesis and written examination had been scrutinized, was composed of Professor Asa Grey, Dr. Jeffries Wyman, and

Professor Agassiz. I was the only student examined, and was alone with them with my heart in my boots. Presently I discovered that these men were not trying to find out what I did not know, but rather what I did know and what my attitude and feeling were toward my work. This I shall never forget.

Professor Agassiz concluded the examination after perhaps half an hour, when I thought it had hardly begun and they had asked me but few questions. They had made me talk and had drawn me out on different subjects, much as friends would have done, and then Mr. Agassiz turning to me, said:—

“Mr. Scott, I think we have watched your course of study and work here at the museum and in other places in the university sufficiently to be aware of what your attainments are. We shall recommend you without further examination on our part for a degree as Bachelor of Science.”

During my last year at Harvard I studied in the museum until some time in the following November, continuing my scientific association with the Nuttall Club, doing some field-work and collecting, and familiarizing myself with the more important classic writings of scientific thinkers — Huxley, Darwin, Wallace, and Tyndall.

I boarded this season at the house of Miss Upham on Kirkland Street. Two notable people formed part of the group at the table. One was the poet and artist, Christopher P. Cranch, who gave me much sympathy and encouragement, and seemed greatly interested in the study I had undertaken, and the other, a law student about to graduate from the university, was Charles Bonaparte of Baltimore.

In November I received a letter from Mr. Straight from a place called Warrensburg, in Missouri. He said he wished to procure the services of some one who could start certain collections of natural history for the normal school situated at Warrensburg; that he had written to Professor Agassiz regarding the matter, and had been referred to me as a conscientious field-naturalist to start the proposed collections and show him how to carry them on. He said the work would be for three months in the spring, beginning the last of March and ending in June, and offered me one hundred and fifty dollars per month for my services during the period, if I were willing to entertain the proposition.

After some consultation with my people at home, and after thinking the matter over, I accepted Professor Straight's offer, leaving Cambridge permanently in March, 1874.

CHAPTER IV

FIRST PROFESSIONAL WORK

AFTER a brief stay at home, having made all preparation, purchasing and packing the necessary material for procuring the proposed collections, I started on my western trip.

Long before this, my brother, having spent a year at Cornell, concluded that he would make farming, and especially cattle-breeding and raising, his future pursuit. Now he was located in a small town in southwestern Kansas, called Mound City, gathering a band of cattle, which he proposed to drive across the plains to a point in the vicinity of Colorado Springs, there to establish the nucleus of a cattle ranch.

Warrensburg, where the normal school of which I have spoken was situated, is in Johnson County in western Missouri, and it was not a long journey beyond to the place where my brother was living at this time. Starting a few days earlier than had been my original intention, I went direct to Kansas City and thence southward to Mound City in the state of Kansas to pass a short time with my brother. I have

forgotten at what point I disembarked from the railroad on nearing my journey's end; it was an obscure station, and about ten miles from it was the town mentioned.

This part of Kansas is as characteristic a prairie region as any in the United States. The plain with its sky horizon, with hardly a tree to vary the monotony, and then almost uninterrupted by fences, afforded a new sensation; nothing I had seen before in the way of landscape was at all like this. The wagon road from the railway station to Mound City was simply a track across the prairie; and it being early springtime, it is perhaps needless to say that the roads were deep in mud—and such mud! It seemed to me more like tar—black and sticky, it was apparently of unfathomable depth. The top soil of the prairie at this point is probably some five or six feet thick, and its abounding fertility made anything like artificial manuring wholly unnecessary. The depth of the soil was plainly shown in the wagon-track described. Moreover, this was a well-watered country, and the few trees apparent were coincident with the water-courses. The streams are not very wide, and have generally cut a channel deep into the face of the country. Such channels are like miniature cañons with abrupt banks which hide the stream flowing at the bottom. The fringe of trees along the banks

indicated in the landscape the course of the stream.

On the open plain were flocks of horned larks, assemblies of chestnut-collared buntings, while meadow-larks were ubiquitous. Flying overhead a turkey-buzzard might occasionally be seen, while now and then a sentinel hawk (genus, *Buteo*), from some fence-post or other point of vantage, presided over the destinies of the field-mice and smaller mammals of the surrounding area.

It was only when the streams were reached, with their bordering trees and bushes, that the great abundance and variety of bird life was fairly to be appreciated. Here the air was resonant with the songs and notes of many birds. The voices of the mocking-bird and the cardinal rang out everywhere, and were fairly rivalled by the cries and calls of two kinds of birds that were present in great numbers—the red-headed and red-bellied woodpecker. Sparrows and other small birds haunted the trees and underbrush, and the waters of the creeks, even where narrow, afforded resting-places and feeding grounds for innumerable ducks which were then on their migration. Among these shovellers, mallards, and widgeon, were perhaps the most common.

Many covies of quail were along the banks, and in the adjacent grass-lands. The proximity of these covies indicated a "bob white" popula-

tion such as I have never seen equalled. To be sure, as will be told later, the deserts of Arizona are more densely inhabited by other kinds of quail, several hundred sometimes being seen together.

At Mound City I spent a very pleasant week studying the local conditions. Among the birds I recall Harris's sparrow as the greatest novelty. A bird of the same genus as our white-throated and white-crowned sparrows, and of similar habits, it presents a difference in appearance. The sides of the head are dull grayish brown, often whitish, the remainder, glossy black. The back is streaked much as in its allies. The chin, upper throat, and breast are black like the top of the head and connected with that region by black in front of the eyes. There is no yellow present. The two wing bars are similar to those of the relatives mentioned, and Harris's sparrow is a little the largest of the three. The same quality of plaintiveness is suggested that one finds in the song of the "Peabody bird."

The prairie-chicken was noticeable, both on the plain and in the vicinity of cultivated ground. Corn stubbles afforded a cover to its liking. Just in front of the little hotel in the village was a large field where corn had been grown the year before, and all the time during my stay the call of the prairie-chicken resounded through the stubble, a source of constant wonder and delight.

Arriving at Warrensburg, after arranging for ways of living and a place to work, an interview with Professor Straight gave me an idea of what he had in view in the way of collections. These were to be chiefly ornithological and mainly for study purposes, and in the form technically known as birdskins. Each bird was to be prepared so that it had the appearance of a dead bird, carefully labeled with the locality where it was obtained, and the sex and date of capture. Such specimens could be handled, examined, measured, and compared, which is obviously not possible, without damage, to a mounted bird. I also prepared a few birds in characteristic, lifelike positions and instructed Professor Straight in both kinds of work. What he particularly wished me to do was to try to accumulate, during the coming three months in Warrensburg, a representative collection of the birds of that region, together with such a series of each species as would not only afford facilities for comparisons in individual variation and other problems, but would also give him a sufficient number of duplicates of most kinds to enable him to make exchanges with ornithologists in other parts of the country, and thus round out the collection to more than local proportions.

Warrensburg was a typical Missouri town of the period. The people were nearly all of southern origin; for following the well-known law of

migration they had come westward from Indiana and Kentucky.

There was little to attract an eastern visitor in the appearance of the place: all live-stock ran at large; the pig, genuine razor-back variety, with its numerous progeny, possessed the land; the jimson-weed ran riot. The streets when wet were deep in mud, when dry deep in dust; the board sidewalk, laid loosely, and often graded far above the roadway with projecting nails at frequent intervals, afforded a precarious footpath. Half-clad negroes and poor whites idly lounged on the business corners, their only occupation chewing and spitting; the cuspidor adorned the houses of rich and poor alike.

There were a few pleasant and well-kept homes, each in the midst of groves of trees and flowering vines, but they only served to emphasize the prevailing squalor and wretchedness of the rest of the village.

The normal school was the oasis in this intellectual and material desert. To this school, in the reconstruction period following the war, came a host of bright and interesting pupils from all parts of the state, eager for the opportunities offered. They were for the most part far more appreciative and zealous than those found at the seats of learning in the East.

A stranger was amazed to find this small village

divided by difference of religious belief into the many sects which here obtained support. In the vernacular, the U. P's., United Presbyterians, C. P's., Cumberland Presbyterians, Old School and New School, each had its followers. The Methodists were divided according to their southern or northern sympathies, and the Christians, Baptists, Episcopalians, and Roman Catholics were also represented. In addition the colored people had their Methodist and Baptist organizations.

It was gruesome in one's drives to have certain historic trees pointed out as the scaffold recently used for the dramatic exit of a horse-thief at the hands of the Vigilance Committee. No less than eleven such victims had met their fate since the war. A horse-thief was a greater offender than a murderer.

Johnson County at this point presents a very different appearance from the region of Kansas which I have described. The country is undulating, may be spoken of as even hilly in places, and is fairly well wooded, the forest not being confined to the vicinity of the watercourses. To the eastward of the town of Warrensburg and at no great distance are prairies of considerable area, nowhere more than six or eight square miles in extent without being broken by the hill-country. Withal, this country is extremely well watered,

and its diversity in environment naturally makes it the resort of a varied bird fauna.

I cannot pass over this part of my life without recalling and recording my impressions of the people as well as of the country and birds. Here I renewed my acquaintance, made the previous summer, with Mr. Johonnot, who was at the head of the normal school, and became acquainted with the members of his family.

This school was remarkable as a radical departure from schools of a like grade that had existed up to that time. Its attitude and purpose is best told in an article devoted to the subject.¹ The fact that a collection of birds such as I have described was deemed an essential part of its equipment indicates something of its character and purpose.

Students in the school, many of them young men twenty years old and more, became interested in Mr. Straight's efforts, and aided him much in the work; most of them were ardent sportsmen, and they procured some of the most valuable specimens. The local gunners were ready to afford whatever aid they could, and I frequently went with one or another of them on extended trips.

¹ "The Story of a School," by Professor James Johonnot. *The Popular Science Monthly*, Vol. XXXIV. No. 4, p. 496. February, 1889.

The bird which they call the jack-snipe in this part of the United States — really the Wilson snipe — was on its spring migration from its winter home to its northern breeding grounds during April; and I must record the incredible abundance of these birds. They were to be found on the damp prairies in the short grass, and a dog was not essential in hunting. Having arrived at such a locality (and there were thousands of acres of this kind of land close to the town), the sportsman walking through the grass disturbed at every few yards, not single snipe, as one does in the East after much tramping and labor with a dog, but "wisps" of six or seven individuals, that would go darting off, zigzagging away, so that it was exceptional not to get a double shot. Single gunners at this time in the vicinity of Warrensburg frequently bagged from seventy-five to one hundred and twenty snipe in a day's shooting. It was only a matter of powder and shot, a good eye, and tramping.

Most of the birds that one finds represented in the Carolinian fauna of eastern North America were present at Warrensburg. The mockingbird, however, was not very plentiful, and was at this point a migrant. The tufted titmouse and the blue-gray gnatcatcher were noticeable, as was the Carolina wren, though the latter was not common. Along the streams the prothonotary warbler

was very abundant during May, and the birds bred in numbers. This is also true of the blue-winged warbler in suitable localities. The orange-crowned warbler was one of the plentiful migrants, while the black-and-white creeping warbler, the blue-backed warbler, the yellow rump warbler, the black-poll warbler, the mourning warbler, the chestnut-sided warbler, the cerulian warbler, the worm-eating warbler, were among the rare birds. The yellow-breasted chat was to be heard everywhere. Camped out near some stream at this time, spending several days in localities that afforded particularly good collecting ground, I clearly recall my sensation on hearing the stillness of the moon-lit night interrupted by the constant singing and noisiness of many chats. Among the birds characteristic of the interior region of North America that were common in the vicinity of Warrensburg were Bell's vireo, the chestnut-collared bunting, Lincoln's sparrow, Harris's sparrow, the lark-finch, and the black-throated bunting.

Nowhere have I seen cardinals and blue jays so much at home in people's front yards as they were in this town. The jays were quite as domestic then in the streets as the English sparrows probably are now, and were less shy than is the robin in the East. The red-bellied and red-headed woodpecker were noisy and numerous.

Once I saw a single swallow-tailed kite, and buzzard hawks were frequent. The wild turkey was reputed to be still a resident along some of the creeks; I fancy, however, that it was nearly exterminated at that time, a culmination which has undoubtedly ensued. Even then the hunters regarded the killing of a turkey as something very much out of the ordinary, though it is well known to have been one of the most abundant birds in the region when it was first settled. Prairie-hens were still plenty in this part of Missouri, and there were many quail.

One of the common migrant birds that arrested my attention was the so-called sand-hill crane which I saw frequently and heard on several occasions passing over. Once a group of five or six of these birds on the edge of a prairie some quarter of a mile away performed the extraordinary manœuvres known as dances. I had a good look at them, and observed all the bowings, genuflections, and pirouettings that have been so admirably described by numerous good observers. The whole was a droll spectacle.

The work undertaken was completed about the middle of June. Should the reader care for details as to the birds observed in this region, a paper published on the subject is cited in the appended bibliography. It enumerates one hundred and forty-eight kinds of birds as the result of

this reconnaissance — because it can hardly be called more — and remarks, —

"A large number of species were doubtless overlooked, and quite a number had left the region before the date of beginning work. The country is particularly rich both in species and in individuals of the several kinds, and is hardly to be excelled in these particulars by regions bordering on the seaboard."

After a short visit with my mother in Plainfield, I went to spend the summer with my uncle, Charles Scott, who had become the owner of the old house in New Brunswick, after my grandfather's death, which occurred in 1871. Here I went on with my bird study and looked about for new professional opportunities. The summer's work was broken by two interruptions: a day at the school at Penikese Island, then in its second year, and a brief visit to some distant relatives in the town of Princeton, New Jersey. It was my first acquaintance with the latter place, with which (though I did not know it at the time) I was to become so familiar. I learned during my stay that the trustees of Princeton College had recently received a munificent gift from the Hon. John C. Green for the erection of a school of science. Of course a new foundation for scientific study aroused my interest. I found that the building was erected in part, but that it would not be occupied for some time to come. The whole country about Princeton struck me as particularly

pleasing, and I thoroughly enjoyed all that I saw.

The summer wore on, and at its close I went to my grandmother's in Brooklyn. Here I stayed some three weeks without definite prospects, and the good-natured raillery, jokes, and questions as to my professional outlook caused me some chagrin, and gave me considerable matter for thought. I had not fitted myself with the idea of becoming a teacher. What I particularly wanted was to be connected with a museum, or opportunity to work as a field-naturalist. Such a plan for making a living doubtless seemed chimerical to practical people.

One day in New York, happening to walk up North William Street, near where the bridge now terminates, I passed by the shops of several taxidermists. Over the door of one of these was the name "John Wallace." For a time I stood and looked in the window, where the effigies of many poor birds and beasts standing in more or less awkward positions were of interest to me both in a scientific and in a technical way; for before this I had become a taxidermist, for ornithological purposes, of no little skill, and could do with my hands certain work, not only with facility, but with great rapidity and ease. Long since I had learned one of the things that had first puzzled me,— how to make a bird stand up.

From that I had elaborated ideas as to mounting birds, based partly on what I had seen in museums, but largely suggested by my familiarity with life out of doors.

Now I began to realize that this handicraft had a commercial value, and thought to myself, "Here is a possible way at least of making a living and becoming self-supporting." I went in and asked if John Wallace was to be seen; a stout, dark-haired man, whom I shall never forget, a forceful-looking man, rather short in stature, and with a decided cockney English accent, told me that he was the proprietor. Briefly I stated to Mr. Wallace what my accomplishments were as a taxidermist, and asked him if he would give me a job. I was not quite twenty-two years old, smooth-faced and juvenile in appearance. He looked me over with apparent interest, and finally said, "When do you want to begin?" I answered, "Any time," and he queried, "Now?" "Yes," I replied. "Then take your coat off and sit down; I'll give you something to do to try you."

Presently I was seated at a bench in company with half a dozen other workmen; a dozen or more bluebirds, song-sparrows, and thrushes were thrown down on the table in front of me, and Mr. Wallace asked me to skin them as fast as I could, poison them, and then show him the result of my work. So, with dirty knives and scissors of an

entirely different pattern from those to which I was accustomed, a pile of meal on one side and some arsenic on the other, I set about my task. Twelve or fifteen birds were given to me, none of them as large as a robin, and in about forty minutes I told Mr. Wallace I had skinned them.

"You haven't skinned them all, have you?" he asked. "Yes, all," I answered. "Well, you must have turned out pretty bad work, or been careless in some way," he went on. "There they are," I said; "look at them."

I have spoken of my facility, but I did not realize it then myself. A kind of incredulous wonder appeared in Mr. Wallace's face as one after another he picked up the skins of the small birds that I had neatly arranged on the table, and looked to see where the fault, if any, lay. While he did not commend me, after looking at them carefully for a moment, he said, "That's all right; do you want to work the rest of the afternoon?" It was then about two o'clock. I said, "Yes," and all the rest of that afternoon I skinned song-sparrows, bluebirds, fox-colored sparrows, white throated sparrows, hermit-thrushes, and warblers, until the pile of dead bodies in front of me was very considerable. When the time came for quitting, I asked Mr. Wallace if I was to come back, and he said, "Yes, if you want to." So far nothing had been said about wages. This was on Thurs-

day afternoon. I found what the hours of labor were, they began at eight in the morning and ended at six o'clock at night, with an interval of half an hour or so at noon. I went on working for Mr. Wallace until Saturday night, when we stopped an hour earlier than usual, and for what I had done he paid me ten dollars. He told me he was willing to pay me thirty dollars a week for the next few weeks at least, and asked me to come back and work for him, which I did. I continued in his employ from some time in October until late in January, living and lodging at my grandmother's house in Brooklyn.

In connection with my labor at John Wallace's, a word with regard to the attitude of the public toward the shooting of song-birds in those days seems essential. This was in the winter of 1874 and 1875. During the three months I spent in this shop my time was occupied almost exclusively in skinning native song-birds for millinery purposes. Early every morning the local gunners from Long Island, New Jersey, and the environs of New York would appear at the shop with the previous day's bag of birds. Nothing larger than a wood-thrush was accepted. About three hundred and fifty or four hundred birds were received on an average each day. These were chiefly the following species: song-sparrows, white-throated sparrows, fox-sparrows,

swamp-sparrows, various kinds of warblers, titmice, nuthatches, wrens, the smaller blackbirds, swallows, and thrushes. Bluebirds and cedar-birds were considered by far the most desirable, there being a great demand for them at that time for ladies' hats. Something like seven or eight cents apiece were paid for these birds, so the man who killed his forty or fifty per day made good wages.

The order of work was somewhat as follows: the men were arranged in two groups — there were eight of us altogether. One man was occupied in winding a conventional ball of tow or excelsior into a body and putting wire through it for the neck. He also poisoned the bird skins which the first man at the table simply skinned. The third man of the group turned the reversed skin, after it was poisoned, right side out, and having put a small ball of tow into the head and introduced the artificial body, passed it on to the fourth man. This one finished the task by wiring the wings so that they were extended, and the tail so that it assumed something of a natural position. The birds were then laid on a board to dry, and later artificial eyes finished the job. Later they were delivered to the dealers on cards which held four, there being three cards in a box.

I was the first man at the table where I sat, and did the skinning; this was all I did for a long time. Generally I skinned anywhere from one

hundred and twenty to one hundred and fifty birds per day. Sometimes the number exceeded this; it depended largely on the amount of material brought in. The dull-colored birds, such as some of the sparrows and thrushes, were not particularly desirable as adornments for hats, fashion not seeming to appreciate the beautiful shades of brown that nature had given them. As a final touch, which was thought greatly to enhance their beauty, feathers from bright-colored birds of any kind, orioles, scarlet tanagers, and various foreign species from South America were introduced and fastened among the feathers of the bird to be decorated. Song-sparrows and thrushes were often graced with scarlet crowns and blue patches on the rumps, and it needs only a little imagination on the part of the reader to conceive the grotesque results.

Two points seem to be worthy of emphasis before leaving this part of the subject. One is the value of manual training. Here was a young man apparently furnished with all the intellectual resources of a good field-naturalist, who was seemingly unable to find a market for that which had been acquired by a long and expensive training. As an incident to the intellectual attainment a handicraft was essential, for a naturalist must know how to preserve and handle the material he collects. Just in the beginning this seemed to be

the only part of the equipment that had a money-value. It is not a little remarkable that what first impressed the trustees of the institution which later employed me was what I could do with my hands.

It is certainly a great advantage to the possessor to be so well drilled in some handicraft that he can achieve practical results. All this, aside from the undoubted mental discipline that accrues to any one through an apprenticeship demanding manual training. He in time arrives at a place where such handicraft (and I believe that all handicraft must lead to that point) becomes a real pleasure.

The other point is the change in public sentiment with regard to the use of birds for millinery purposes. Legislation has not been so vital a factor in this achievement as public sentiment. Anything in the way of study or reflection which brings home forcibly to the student or thinker the economic and æsthetic values of organic life, is productive of a solicitude only now beginning to be awakened. So far-reaching are our unintentional acts in changing the fauna or the flora of a given region that great care and foresight must be exercised. The ensuing results are prodigious. The extinction of a given kind of plant or animal may be the result. Hence all consideration should be given to positive intentional acts, for

the wave of results widens from a centre of action as do the waves from a stone cast into water.

My stay with John Wallace continued until some time in January. Early in that month, having thought it over, and recalling my visit to Princeton the previous summer, I concluded to go to that town, call on some of the authorities of the college, and find out what opening existed there. Asking my boss for a holiday one Saturday, I visited Princeton, called on Professor Arnold Guyot, and laid the whole matter before him. I explained to him that I understood they were about beginning a museum of natural history in connection with a school of science. I told him where I had studied, and what little I had done; and finally asked him if there was a chance for me to get a place in the new institution. To enforce my proposal I suggested that I would be willing to work on trial for a given period without compensation. As a result he promised he would, after consideration, advise me.

About two weeks later I received a letter from Professor Guyot, stating that he had consulted with the college authorities, and that, from February 1 until Commencement, the trustees would employ me to rearrange such collections as they possessed, and to add to them if possible. In return for my services they offered me, during

the time of probation, fifty dollars per month, and a room in one of the college buildings free of rent. Professor Guyot further said he would be glad to see me again at an early date.

On my second visit to him we agreed that I should begin during the month of February at home in Plainfield, making collections of local birds there, and that some time early in March, I should come to Princeton. Such an arrangement was effected because there was no place finished in the School of Science where anything could be carried on, nor was it possible to move any of the collections that already existed into that building.

CHAPTER V

PRINCETON

PRINCETON COLLEGE in 1874 and 1875 presented a very different appearance from the university of to-day. A glance at the conditions at that time may prove of interest.

The buildings on the campus were Old North or Nassau Hall, the chapel directly to the left as one faces it, and a little beyond the Chancellor Green Library, just opened. Dickinson Hall too had been finished but recently, and the final work on the original part of the School of Science was being completed. Back of Old North, East and West Colleges formed the sides, and the two halls Whig and Clio the other face of the quadrangle. Reunion Hall looked very much as it does to-day, only newer. Going west, the next building was the new gymnasium, and beyond it the Halstead Observatory. These buildings, and one other (that now used as the university offices) were all that then occupied the campus. The president's house was the one now used by the dean, and here I had my formal introduction to Dr. McCosh.

Stately elms and other fine shade trees formed

with the open stretches of green a fitting setting. Dignity and age were the impressive characteristics of the whole. In front of the School of Science, between it and Nassau Street, were dwellings of the professors, and other houses stood on the site now given to the Marquand Chapel.

The personnel of the Faculty consisted of nineteen professors and tutors. Notable among these was the president, Dr. McCosh, with whom one had but to come in contact to realize his force as an executive, and his keen intellectual perceptions. It is not for me to attempt a critical estimate of a man so notable as Dr. McCosh, but it is pleasant to recall his commanding presence. He was easily a leader among men, and in an assemblage of hundreds, made up of the picked scholars of the land, his was the most distinguished figure. With all his old world scholarship there was combined the most fervent love of his adopted country.

In the work which I was doing he always manifested the keenest interest, and much that was accomplished is due to the hearty support he gave. Dr. John McLean and Professor Stephen Alexander were prominent among the older men; while Professors Atwater, Schenck, Duffield, Packard, and, last but not least, Professor Arnold Guyot, were a group of educators typical of the time. Among the men who had recently

assumed position in the college were Professors Brackett, McCloskie, and Cornwall, for it was not until some time later that Professor Charles A. Young became one of the Faculty. The total number of students at this time was four hundred and eight, twenty-five of the number being in the School of Science.

The museum with which I became connected occupied, as it does to-day, the upper story of the main part of the School of Science — three large rooms. The cases for the reception of specimens, designed by the architect of the building, were nearly completed; and even then it was apparent to me at a glance that they were not well adapted for educational or exhibition purposes. The preponderance of wood over glass was noticeable, and the dark coloring of the shelves and background was not calculated to aid the observer in seeing the specimens.

Besides the E. M. Geological Museum, which was already a flourishing part of the college, the natural history collections at Princeton consisted of a considerable number of badly stuffed native and foreign birds, a few animals, and some of the commoner reptiles of the immediate vicinity. These were all mounted collections, and of no value from an æsthetic or educational point of view.

The courage of youth is traditional, and looking back I believe that without it I would never have

taken my first radical step in reconstructing the zoological collection. After looking carefully at the material, which was then stored in the upper room of what is now the university offices, I determined to destroy most of the existing collection. It doubtless had some historic value; that was all. So, after taking out the artificial eyes of many birds and other animals, all of which were in a process of dissolution, from moth and age, the remains were consigned to the furnaces then in the basement of the School of Science.

I had brought with me from Plainfield, as the result of the month spent there, between forty and fifty mounted specimens of local birds. Dr. Guyot told me that the trustees desired that these and any other material available should be exhibited at Commencement in the new museum. It was hoped that a fair showing, indicative of future results, would be made.

Realizing that I would have but little time for field-work, or even to go to the fields to obtain new specimens, I looked about and sought advice as to some local hunter or sportsman to aid me. Here fortune certainly smiled. I was recommended to make the acquaintance of one Charlie Hubbard, a negro, who had the reputation not only of being an excellent sportsman and good shot, but who, it was said, knew much in general of wild creatures out of doors.

This man is worthy of more than passing remark. He served me for nearly three years, not only in Princeton, but, as will presently be seen, in other fields. He was one of the most unerring shots it has been my fortune to meet. His knowledge of birds, especially those associated with the region about Princeton, was not confined to either game-birds or the commoner species—the songsters to be found in every yard and garden—but he knew at sight and had names for almost all the smaller birds of the region. However, it was as a woodsman, as a man conversant with nature whose knowledge has been acquired by intimate association with it at first hand, that he most impressed me. The first two or three short excursions which I took with him in order to find out whether he would be able to render real assistance convinced me how valuable his services might be made.

Every passing movement, every note and noise, the stirring of a leaf, the song of this bird, the cry of that one, the language of the squirrel, the stealth of the weasel, were full of meaning to him. The signs that so few read, but which are a story to the observant, were his books. Needless to say, I found that he did not simply know how the birds and animals looked and what they did, but that he was conversant with their coming and going, the place, time of year, and method of their

breeding, what they fed on and, in short, their general economy.

My first interview with him was an entertaining one. After discussing the possibility of his working steadily, and arranging with that end in view, he turned to me and said, "You know there are a good many kinds of birds in the woods which very few people have seen, and some which I do not think any one has seen but myself."

"You really think there are new birds in this vicinity that no one knows?" I asked. He replied, "Yes, I am sure of it." "Well," I said, "whenever you bring me a bird that I cannot show you is already known to men who have studied, described, and perhaps figured it in some book, for that kind of a bird I will give you one hundred dollars in addition to your regular wages." This made him open his eyes; but at the same time it did not convince him, for he said, "You will surely get some," and I fancy counted on spending the prize money he would obtain. As his work rolled on through the years with me, he appreciated the position, and with it came a growing respect for a kind of knowledge heretofore unsuspected by him.

Of his antecedents I have been able to find out little. He was a man about five feet nine inches tall, rather slight in build, but of fine physique, and of the general character that is described by the

word "wiry." His color was more that of an Indian than a negro, and his features were not those associated with the African, but were more aquiline, and indicated Indian ancestry. His hair was long, and though curly, was not like that of the typical black man. In his movements, the Indian element again predominated. There was a stealth, a noiselessness, a grace and lightness wholly unlike the heavy, clumsy gait of the field-negro of the South. He was equally at home on land and water. No one I have seen could go through the woods more silently or pole a boat up-stream more noiselessly, taking advantage of every bend of the shore for shelter.

From early in March until the day of Commencement I was busy in accumulating, mounting, and preparing specimens for the collection, and in rearranging in the new cases such material as remained from the former collections. Being anxious to make as good a showing as possible, frequently this work employed me until late at night, and it is needless to say that it began early in the day. As a result, at Commencement there was on exhibition in the new halls, no vast collection, but one that showed growth. The birds were all mounted on natural twigs or branches, for even at this time I had determined that the traditional "T" stand was not only ungraceful, but did not allow of sufficient variation

in position of the specimen to indicate its individual characteristics.

As a result of my trial work, which seemed to meet with the approval of the trustees and friends of the college, I was engaged at an advanced salary for the next year, and my title was that of Acting Curator of the Museum of Biology. Among the trustees and friends of the college I must especially mention the Hon. John A. Stewart and James W. Alexander, Esq., both of New York, whose interest in the museum, and whose kindness to me personally, proved incentives to further effort.

All through the summer and fall of the year 1875 I continued steadily to prosecute the work of accumulating a local collection of the birds of Princeton, chiefly mounted specimens, supplemented by some skins. By Christmas time some six hundred specimens had been collected and preserved in this way.

The great obligation I owe to the late Samuel J. Stockton, Esq., for his interest and aid, should be acknowledged. He allowed me the full run of his large estate, "Morven," where some of the most valuable material in the way of birds for the museum were secured. Richard Conover, Esq., of South Amboy, also became a friend, and it was through his instrumentality that I made the first expedition for the purpose of increas-

ing the collection of the college museum. He told me in the fall of 1875 of a part of Florida where he had purchased an old Spanish grant of some two thousand acres. Here he had undertaken to cultivate what was at that time an almost unknown crop in the United States, — the orange. He aroused my curiosity and excited my enthusiasm by his glowing descriptions of the country where he was carrying out his project. His stories of the game and fish, of the birds and beasts, of the trees and flowers, of the rivers and woods, determined me to make a more intimate acquaintance with them. Finally he invited me to make his plantation my headquarters, if I could arrange to go to Florida.

I consulted several of the trustees on the subject, notably Mr. Stewart. He and the late William E. Dodge, Esq., of New York, made it possible for me to undertake the expedition, on which I started the day after Christmas.

Mr. Conover had discoursed to me of the water-ways of Florida, and the necessity of having some kind of a boat; hence a light, portable metal row-boat was part of the baggage, and the kind of stores and supplies essential in making collections completed the equipment. As a factotum I took with me Charlie Hubbard.

Florida in 1875 had no railroads south of Jacksonville. In fact, the only railroad of conse-

quence in the state was the one from that point to Cedar Keys. Arriving at Jacksonville, we took a primitive steamer on the St. Johns to Palatka, and here disembarked, and following the instructions given by Mr. Conover, reembarked on an even more antiquated boat, a stern-wheeler of the wheelbarrow type, which carried us up the Ocklawaha River to its headwaters at Silver Spring. The Ocklawaha presented at this time a picture of exuberant bird life along its banks and in the trees that overhung the stream; I had almost said in the ceiling of trees, because the river was so narrow and winding that there were only short intervals where the branches did not meet overhead and hang above the steamer's deck.

Among the water-birds, the water-turkey, or darter, two kinds of beautiful white herons, the little blue heron, the Louisiana heron, the great blue heron, and the rosy spoonbill were all conspicuous. White and wood ibises were constantly startled from the banks or limbs by the progress of the boat. Among the land-birds, woodpeckers of many kinds were everywhere, paroquets in flocks of from forty to a hundred were seen constantly, and as for the smaller bird life, the woods fairly teemed with it. Five or six times as we ascended the stream large flocks of wild turkeys were to be observed close along the banks. In short, never had my wildest fancy painted, not

only so many kinds of birds at one point, but such a vast multitude of representatives of the several kinds.

Nor was the feathered life the sole interest. Alligators constantly swam in front of the steamer, or basked somnolent in the sun on the bank. Many of them were huge creatures, though they were of all sizes.

The Ocklawaha winds through a succession of cypress swamps, and these stately trees, festooned with many parasitic plants and draped with the pendant Spanish moss, formed a fitting setting to this theatre of life. Frequently, at higher points on the banks of the river, groves of wild orange trees might be seen as part of the undergrowth of the live-oak forests which occupied the drier regions through which the river passed. All this gives but a faint idea of the prodigality with which nature had adorned this most marvellous region. Words are feeble to paint it.

Our journey was terminated at Silver Spring, a wonderful pool of water some two hundred feet across and almost circular, the depth and clearness of which gave a singular sensation to one riding in a boat on its surface. It seemed almost as if one were suspended in the air. We disembarked at a tiny wharf, and the only building which interrupted the beauty of the sylvan scene was the "warehouse," a kind of shed just back of the wharf.

My objective point was Panasofkee Lake, a sheet of water in Sumter County, fifty or sixty miles from Silver Spring, almost south of it. After much searching a venerable negro with a team of oxen and the rudest of wagons was found to carry us and our luggage, conspicuous among which was the metal boat, to our destination. We were two days and nights and part of another day on the road, going through a region which presented new wonders as each mile was traversed. About noon on the third day we reached the plantation, and were welcomed by the overseer.

The buildings were a dwelling-house, another small house built for Mr. Conover's use, and a log cabin containing the kitchen and dining room. Everything was placed at my disposal, and we were soon busy settling our quarters and preparing for work.

Distant a hundred and fifty feet in front of the house ran the outlet from the lake, a quarter of a mile away. The "run," as it was called, was a very considerable stream, a gunshot wide, one of the main branches of the Withlacoochee River. All about, except where a clearing had been made for the proposed orange-grove, was a primeval forest. The plantation itself was chiefly what is known in Florida as a "hammock." The smaller trees consisted of different species of bay and magnolia, interspersed with groves of wild

sour oranges. The fine-leaved water-oaks grew everywhere. Shading all these, and towering high above them, were the giant live-oaks, often five or six feet through near the ground, and with spreading limbs extending seventy-five feet on either side. It will give an idea of the size of these trees and the difficulty in felling them when the reader learns that the usual method of clearing the land was to girdle them near the ground, let them die, and then cut down the smaller ones, the huge skeletons of the live-oaks standing for years afterward.

In many places in Florida there were at this time extensive groves of wild oranges. Universally they flourished beneath the shade, and were protected by large trees. Frost nor sun nor wind injured them in such situations, and they bore luxuriant crops. No hint seems to have been taken, from such conditions, by the fruit grower. The ensuing result tells its own story.

Panasofkee Lake itself is a sheet of water eight miles long and some four miles wide in its broadest expanse. The country about it was then practically unsettled. There were but few houses, and these occurred at long intervals, so that we had reached an almost virgin wilderness. The outlet of the lake flowed between that body of water and the Withlacoochee River. This "run" wended its course for some two miles before it

reached the main stream, which was one of the characteristic rivers of Florida, very similar in appearance to the Ocklawaha before the advent of the hunters.

Along the "run" were groves of cypress, and its marshy banks were fringed with saw-grass. Just in front of the house this had been cleared away, leaving an open space on the bank. The "run" afforded a highway morning and evening for great troops of water-birds,—ducks, herons, and ibises,—which spent their days feeding at points on the river, and returned at night to roost somewhere on the borders of the lake. In the morning and evening this crowded thoroughfare formed a most lively and interesting spectacle. Game was abundant in the woods about, deer and bear frequently coming close to the house, and wild turkeys could be heard gabbling at sunrise and sunset. The nearest neighbors were located some five miles away, which will emphasize the remoteness of the plantation.

Space forbids dwelling in these pages on the details of the stay at this point, except to notice one or two of the most salient ornithological features that the fauna of this lake presented.

On its shore were large swamps with great areas of low-growing willows, and these were the roosting places in winter and the breeding places in summer of myriads of water-birds,—herons,

and ibises. Before our departure thousands of snowy herons and large white egrets had assembled, built their nests and laid their eggs in this willow swamp. Approached from the lake it presented the appearance in the distance of a miraculous circus-tent, of so prodigious a size that it appeared to cover at least a mile with its front. A better simile would be the snowy peak of some mountain-range, except that the whole was so near the lake-level, the willow trees being not more than ten or twelve feet high at any place.

At another place near the cypress along the edge of the lake large flocks of ducks might be seen on the sheltered surface at almost any time during my stay; and I can only liken the flocks of fresh-water coots to great black rafts. The birds were as close together as they could sit on the water.

But there were two birds at Panasofkee Lake that produced a greater impression on me than anything else; the first was the limpkin or giant courlan, or better still, the crying bird, which was extremely numerous and very tame. During the mating and breeding season, which was coincident with my stay at Panasofkee, these birds were very noisy. Their cry is most ear-piercing and penetrating. It is to be likened to repeated cries of some one in great distress; and when I say that frequently companies of from ten to fifty of

these birds would assemble on the bank of the "run" just after dark — for they were somewhat nocturnal in their habits — and begin a chorus of this description; it will give some idea of the din which prevented my sleeping the night after our arrival. Charlie Hubbard was sent out to drive the birds away, as I knew they were close at hand. He did so, but had hardly returned to the house before the uproar began anew. I sent him back again, and after killing a number with a stick, the rest were sufficiently frightened to remain at a more reasonable distance. On subsequent nights I had frequently to wage warfare on these noisy creatures.

The courlan is a kind of rail, the size of an ordinary fowl, but with long legs, neck, and bill, so that the bird stands something over two feet high when erect. The plumage is of a beautiful brown bronze, glossed with deep green and speckled with irregular triangular-shaped silver-white spots.

The other bird, which in all my subsequent wanderings in Florida I have never once encountered, was the everglade kite or snail-hawk. This is a bird not unlike the marsh-hawk in general appearance, and decorated on the rump with a similar conspicuous white patch. The male is a dark lead color, and the female brown, somewhat variegated with lighter markings. Both the bill and claws of these hawks are partic-

ularly slender and curved. I found the everglade kite was a very plentiful bird at Panasofkee Lake, discovered that it was a migrant and gregarious in its habits, so that frequently a dozen or more were seen together. The name "snail-hawk" is of local origin, and has to do with the habits of the bird. At this point their food consisted almost entirely of a fresh-water snail of large size which was common in the shallower regions of the lake, where the water is not more than a foot or eighteen inches deep. Over such areas these birds hunted very much as the marsh-hawk does over the fields. Perceiving a snail, they dove, caught it, and retired with it to some favorite branch near by, when the slender hooked beaks and claws were used to extract the inhabitant from its shell. This was done with so much precision and care that a shell was seldom defaced or the operculum broken. One had only to look at the great mounds of these snail-shells under the favorite lighting places of these hawks to be aware of what multitudes inhabited the lake and what numbers the hawks destroyed. The everglade kite bred commonly at points on the lake, and had just completed its nest-making the end of March. Though a fine series of the birds had been collected, some forty in all, their numbers seemed in no way diminished.

Now, the curious point in relation to the two

birds mentioned, the giant courlan and the everglade kite, which even the tyro knows are widely separated forms of bird life, is that both resorted to this spot to feed on precisely the same kind of food. The large fresh-water snail is almost exclusively the food of the giant courlan and entirely the food of the everglade kite. The reader is referred for details to a paper published as a result of my explorations of this region, dealing with the subject at length.

During my stay Mr. Conover visited his plantation, remaining some ten days, and we enjoyed many hunting and fishing trips together.

Panasofkee Lake was left somewhere about the 20th of March, with very satisfactory and extensive collections, which, besides birds, embraced many specimens of alligators and other animals and reptiles characteristic of this part of Florida, the whole making a freight-load for a six-ox team to Silver Spring.

Princeton was reached again on April 2, and shortly after the Florida collections arrived. Between this time and Commencement I was able to place much of the material on exhibition, though even at the present day the large series of bird skins brought back from Sumter County are seen only by the special student, or by such inquirers as are more particularly interested in birds. These are all stored away in cabinets, secure from

light and dust as well as from other enemies, and look to-day much as they did when they were collected, over twenty-five years ago.

By the second Commencement after coming to Princeton, the museum began to assume an air of growth and prosperity. There were no longer cases absolutely empty, though the array in some of them was sparse and meagre.

In the autumn I made a short trip to the coast of New Jersey to secure specimens of gulls, ducks, and sea-birds. The successful undertaking was largely due to one of the trustees of Princeton College, since dead, Henry M. Alexander, Esq., of New York, who always gave generously whenever asked to aid in building up the new college museum. This trip to the New Jersey coast had a large influence on the work for the coming year. During this short exploration the necessity of developing what might be called the Marine Ornithology of New Jersey in the collections became evident, and plans were matured for a protracted stay to that end, at the same point, during the coming spring and summer of the year 1877.

A shooting lodge, kept by a man named Joe Ridgway, stood some three miles south of Barnegat Inlet, on the outside beach. Here I made my headquarters. "The beach," as it is called (a long stretch of islands off the Jersey coast), where this lodge was situated, is six miles from

the mainland, a large bay intervening. At this time the buildings in connection with the lighthouse and the lodge some three miles away, for the accommodation of gunners and sportsmen, were the only houses for ten or twelve miles. The region was then a famous one for wild ducks and geese in the fall and spring, and for bay-bird shooting in the spring and late summer months. Very considerable colonies of terns still bred here and on the adjacent islands, and a little to the south was a vast colony of laughing gulls.

The museum work was continued until about March 20, 1877. I then arranged to be away from the college for the rest of the year, except for a few days at Commencement. In June of this year my marriage took place at Ithaca, and Mrs. Scott returned with me to Barnegat. For the next five months, that is, from April 1 to September 1, I collected the birds of the coast, as well as many marine animals which were preserved in alcohol for laboratory use. As far as the bird-work of this time is concerned, reference is made to a paper published on the subject cited in the appendix.

It may be well, however, in this connection, to get a panoramic view of the bird life of the sea-coast of New Jersey in 1877. This was still the breeding ground of great numbers of terns and

laughing gulls. In addition, in the vicinity was a small colony of black skimmers. I saw them constantly during the summer spent at Barnegat, but generally only in pairs, and never more than five or six individuals together. There were beside vast quantities of game-birds in the way of ducks and geese, and the land-birds present are fully dealt with in the paper I have mentioned.

At this time Barnegat was a Mecca for sportsmen, and still is, so far as fishing is concerned; but the persecution of the gulls and terns by egg hunters, and the almost incessant gunning for ducks, geese, and bay-birds, have had the inevitable result. The terns and gulls have been practically exterminated as breeding birds in the region, and the numbers of game-birds have been so largely decreased that few sportsmen care to visit what was once a famous resort.

In concluding the sketch of this part of my career, I must introduce a friend who was constantly with me from the spring of 1875 for sixteen years. In the spring of 1875 a setter bitch which I owned had a litter of very fine puppies. I gave away all but one. This puppy I broke for the peculiar purposes necessitated by my work with birds. I took him away from his mother when he was five weeks old, and kept him with me in my rooms, at the museum, and in all my journeys for the next two years. He was a red

Irish setter of the old-fashioned type, a dog of exceptional beauty and great intelligence, whose appearance was remarked wherever he went. Moreover, he was a gentleman.

My first efforts in training were the usual hand-breaking that a dog receives preliminary to the outdoor education. He was taught to come when called, to lie down, and to retrieve. After this was thoroughly understood, and the relation of confidence was absolutely established between the dog and myself, so that everything I asked him to do became a pleasure to him, the time approached for my first journey to Florida. The dog was then something over eight months old; but, so far as I am aware, had never seen a gun, for I had been careful, as his mother had been gun-shy, to train him fully in other matters before making a field dog of him. To be sure, he walked out with me, but these walks were limited to the town, and generally consisted in the daily rounds I made backward and forward to the museum and to my boarding place.

One day, about a month before starting for Florida, I pulled a gun case out from under my bed. I put the several pieces of the gun together, and without thinking, threw it to my shoulder. All this time Grouse, the puppy, had been sitting by, very much interested in observing my movements. As I made the motion with the gun, he

cowered and ran under the bed, betraying all the signs of great fear. So far as I know, he had never before seen a gun, much less heard one, and, of course, there was no report and nothing of that nature to frighten him now. I think it may have been the quick motion I made which alarmed him. Besides, this dog was not a coward. I have rarely seen one more fearless. He thoroughly believed in everything I did; that is what I mean by having established a relation of confidence between us. My word was his law, but now when I called him, for the first time he disobeyed me. I do not know whether his fear was a case of inheritance, but I am inclined to think that heredity had something to do with it, as I had been very careful.

However, I was thoroughly persuaded of the good qualities and the fine character of the animal, and while I knew it an almost hopeless task to overcome the fears of a gun-shy dog, I determined to try it. I now walked with him in the fields, and he went with me to Florida on the trip I have described. Game-birds were not very abundant about Princeton, and I did not have the opportunity to hunt him at all that fall, but when we arrived at Panasofkee Lake, I determined on making a final effort to overcome his fears. For a time this seemed futile. One day, however, having him in the boat from which I was fre-

quently shooting, and wishing to land on a certain grass-point which was rather low and swampy, I told Charlie to push the boat in. The dog was fastened with a long string which had been shortened while we were out on the water to keep him from jumping overboard. As the boat came to the shore I unfastened the cord and he made a run to scramble out, but scarcely had his feet touched the shore when he came to a full stop, rigid and immovable. Handing the leash to Charlie and taking my gun, I walked just ahead of where the dog stood motionless, and an English snipe got up from under my feet. As it flew off I killed it when some ten or fifteen yards away. Grouse still pointed, and did not seem afraid. I loosened the string, and told him in an ordinary way to fetch it. From that day on Grouse never manifested fear of a gun. He had fully appreciated the result that followed the proper use of the weapon.

The next spring, that of 1876, on our return to Princeton, there was an elaborate ceremony in connection with the Centennial, and on the lower part of the campus, where Whitherspoon Hall now stands, was a battery of some seven or eight brass cannon. I went out to see the celebration and took Grouse. Instead of fearing the cannon he was enthusiastic about them and the noise they made, romping up and down in front of

them in the smoke, following each discharge and barking with joy and excitement.

During the time I was in Florida, I encouraged Grouse to become an aid to me in bird-collecting; and while he was more than an ordinary good dog on game-birds, he soon became very expert in retrieving small birds killed in the grass. He also learned to point the nests of small birds on the ground or in bushes, or even when not too high in the trees.

Dog stories are proverbial; but before leaving Grouse for the time, I cannot but refer to his keenness of smell. I have frequently thrown as far as I could, and at random into a grass field, a bunch of keys or a coin, and he would always find and retrieve them without difficulty. I have done this when he was not with me, and brought him to the place an hour afterward, or even the next day, told him what I wanted him to do, and in less time than it takes to recount it, he would accomplish the end. Grouse was much esteemed for his many fine qualities. His progeny were in great demand. While his offspring were, as a matter of fact, few in number, all the owners of younger dogs in Princeton, that might by a possibility be called red setters, claimed descent for them from this great dog. This breed is still extant.

That Grouse was a general favorite, the following episode reveals. One spring day we noticed

that he seemed strangely restless; he wandered through the house and was unable to find repose. Toward night the nervousness increased, and when one of my neighbors of the faculty called in the evening I asked him to look at Grouse and advise me what to do. The gentleman had known Grouse from puppyhood, and was much attached to him. The poor dog came at his call, but could only feebly wag his tail in recognition. Dr. —— at once detected some brain disturbance, and advised us to administer bromide, watch Grouse carefully, and if he became worse to confine him in a room alone. All night the poor creature walked up and down in distress, save for the few brief periods when we could soothe him by patting and rubbing. The bromide seemed to have little effect. By morning he was suffering so keenly that we sent at once for a physician. Remedies were given, but did not help him, and it was finally decided that there was danger in having him any longer at large.

A room was prepared. Water was placed where he could get it, and even bars were fixed on the windows, the doors securely fastened, and here poor Grouse was imprisoned. We were overcome with grief, as his case seemed hopeless. I sent the family to a hotel, as they could no longer endure the sufferings which they were powerless to relieve.

Confinement seemed to increase his agony, and he soon began to dash up and down the room and to bite imaginary objects. I started out in despair. In those days no veterinary surgeon of repute lived in the town, but a man of some experience, usually in his cups, was supposed to know how to doctor animals, after a fashion. Meeting the man, I appealed to him in my desperation, and asked him to go with me, at the same time securing Charlie Hubbard, who had nursed Grouse through his childish ailments, as an assistant. Charlie put on a heavy glove, reached through the door, grasped the frantic dog by the collar, and slipped a muzzle over his head. It seemed a most dangerous undertaking, for Grouse by this time had all the symptoms generally ascribed to a mad dog. The veterinary, however, was fearless, and the moment I spoke to Grouse he became more quiet. Heroic measures were resorted to; he was blistered and poulticed, opiates were administered, the extreme suffering was relieved, and he soon became unconscious.

But this was not the end. For a week Grouse lay at the point of death. The physician visited him twice each day, for brain fever and inflammation of the bowels had developed. The family returned. We relieved each other in his care, while Charlie was installed as head nurse. Then the college boys heard of Grouse's illness, and

volunteered their aid, for Charlie could not be trusted to administer the brandy and beef tea at regular intervals, and we were all worn out. During two weeks, relays of college students watched with him at night. One day he became conscious, and recognized me by licking my hand as I patted him. But his past was a blank; he had to begin life as a puppy once more, and again be taught all his former accomplishments. This second education was, however, acquired with ease.

To show the extent of his popularity, I was constantly stopped in the street by many friends who asked with much concern, "How is Grouse today? I am so sorry to hear of his illness." And our own physician, who did not like dogs, and for whom I had not ventured to send, took me to task for not calling him when Grouse was ill.

I tell this episode to show not only the love that a faithful dog inspires, but to make it plain also that a dog in illness should receive the same intelligent care that is accorded a human being.

CHAPTER VI

THE PLAINS AND COLORADO

THE opening of the college in September necessitated our return to Princeton early in the month, though I was loath to leave Barnegat, and to forego further continuous observation here, for it presented much both of a novel and interesting character.

Few people realize the wealth revealed to the careful and observant collector in any field of nature. At this time comparatively little was known about the exact details of the migrations of some of the commoner shore birds, and there are questions still to be solved. For instance, as to the presence of such birds as the dowitcher, the knot, and the turnstone on the coast of Florida, and in intervening regions from there northward to New Jersey during the months of June and July. The two former birds, at least, breed very far north, and yet are represented by an appreciable element of individuals even as far south as southern Florida in midsummer. But the point to which I wish to call attention is the short space of time spent by the dowitcher

and the knot at their summer breeding ground in the far North. The last dowitchers observed passing northward along the Jersey coast were late in May, and the first arrivals returning from the North made their advent on July 6, when a pair were seen. The next day several small flocks appeared passing South. Thus, in a period of less than sixty days these birds journeyed presumably over thousands of miles, and returned by the same route. In addition, it is also probable that they had laid eggs, spent a very considerable number of days incubating the same, and finally had reared broods of young ones which came South, almost simultaneously with their elders to the Jersey coast, full-grown birds. It is therefore evident that the work and study of Barnegat was abandoned only because of the greater exigency of other demands, and not from lack of material or interest.

My work at Princeton during this and the succeeding seasons dealt largely with the winter bird fauna of the immediate vicinity; and some of the observations made in connection with this work, especially that of the winter of 1878 and 1879, are recorded in a paper cited in the appendix.

Notable was the advent in the vicinity of Princeton during this winter of great numbers of a kind of small owl known as the saw-whet, which became very plentiful in certain cedar

groves not distant from the town in the early part of December. I visited several of these groves, and cite from my notes as follows:—

“Until last fall I had never met with the saw-whet owl (*Nyctala acadica*) at this point, and was surprised at having one brought me on December 1. This bird was taken from a hole in a tree alive. Just after a severe storm, in the early part of December, I was told of some small owls being quite common in a certain cedar grove. In this and in an adjacent grove on December 10, I obtained ten saw-whet owls, and the following day seven more. Since that time until writing I have found these birds more or less common in cedar groves, and have obtained many more specimens. During the day they roost in cedars close to the trunk, and can frequently be taken alive in the hand. They seem to affect scattered groves, where the trees do not grow too thickly. Most of the birds taken are females, and judging from their ovaries, the time of breeding cannot be more than six weeks or two months distant.”

I speak particularly of this occurrence as I have never noticed the birds in subsequent years, except casually and singly. There was also a very remarkable migration of red-tailed and red-shouldered hawks, as well as numbers of rough-legged buzzards. On some of the meadows along the Millstone River during this winter almost every isolated tree was the haunt of one of these large hawks, and it was not unusual to see two or three of them in the same tree. I remember once collecting five individuals within close gunshot of one another. I did not pick up any

of the dead birds as they fell from the trees until I had killed the last one. Being anxious to have a good series of this kind of bird of prey in the museum study-collections, I offered a small price for large hawks, thinking to obtain a few specimens in addition to those I could collect myself. One day, shortly after Thanksgiving, a man drove up to my house having in his wagon a large, roughly built, slatted crate. He told me he knew of my desire to get hawks, having heard it from a neighbor, and that he had collected some during the past few days and had them ready for delivery. Examining more closely I found there were in his crate twenty-two red-shouldered and red-tailed hawks alive and uninjured, and so recently captured that they had not had time to wear or dirty their plumage. These birds had all been taken in an ordinary steel muskrat trap placed on top of a long pole, which for this purpose had been driven into the ground of some meadow which the hawks frequented. The jaws of the steel trap, being bound with cotton wadding or other soft material, did not injure or break the hawks' legs or lame the birds in any way. This will give an idea of the abundance of these large hawks at this time.

I cannot dwell on the details of my field-work during these two winters, and can only call attention in general to the great numbers of the birds

of prey that fed on field-mice and the smaller mammals at this period during the winter season in New Jersey. This presents a strong contrast to the condition of affairs that now exist. Such a result, the great decrease in the large mouse-hawks, has accrued almost entirely through the systematic persecution to which they have been subjected. They are formidable looking creatures, and coming in the classification of the farmer under the head of "hen hawks," they have been treated without mercy.

It is true that both the red-shouldered and red-tailed hawk make occasional raids on poultry, but these are rare events. Their food consists almost entirely of field-mice and the smaller mammals which levy a heavy toll on every stack of grain and every granary, much more than would compensate for the few fowls that the hawks kill. Therefore, the farmer in destroying indiscriminately the larger hawks unwittingly aids in the increase of enemies that, from an economic point of view alone, do him much more damage.

It is the slim, long-tailed, short, round-winged hawks of the genus *Accipiter* that habitually prey on smaller birds, poultry, and game. They are not nearly so formidable in size, and are not conspicuous when perching.

During the summer of 1877 a party of professors and students from the university had made

an expedition for purposes connected with geological and paleontological research to the Bad Lands of Wyoming, and had spent some little time in Colorado. They were so enthusiastic on their return as to the wealth of animal life in the country, dwelling particularly on a region high in the mountain chain near the headwaters of the Arkansas River, that I planned, if possible, to spend the summer vacation of the year 1878 in Colorado. I would have started early in the season but that, in addition to my duties as curator of the museum, I was called on this year to give a course of lectures, supplemented by laboratory work to the senior class. These lectures dealt with the comparative anatomy of vertebrate animals, and were given during the second term of the senior year. Such a course continued to be part of my duties for the next few years.

Among the students of the first class of this kind which worked with me I must mention two men, both of whom have become notable naturalists: William B. Scott, now and for many years Professor of Geology and Paleontology in Princeton University, and Henry Fairfield Osborn, Professor in Columbia University, Curator in the American Museum of Natural History, and United States Paleontologist. After their study with me in their senior year both of these gentlemen took part in the expedition to Colorado, and

it was largely due to their accounts of the trip that I determined to go there in 1878.

Through the liberality of a number of trustees and friends of the college a fund was provided which enabled me to undertake the proposed expedition. On this journey, as on many subsequent ones, I was accompanied by Mrs. Scott, and we shared together the pleasure of visiting an unfamiliar country.

Railroad travel was much slower in those days, so we had a very fair look at the plains crossing Kansas and eastern Colorado. This region from central Kansas west was at the time a great unbroken plain, and had not yet been invaded by the vast cattle ranches and sheep runs which have since made it famous, and which in turn have given place to practical agriculture.

Few travellers realize in crossing the United States the steady ascent coincident with the journey from the Missouri River to the eastern edge of the Rocky Mountains, say at Denver. It seems as if one were travelling over a vast flat plain, which is only here and there broken by undulations of so inappreciable a character as to be included in the whole, and yet the rise in this five hundred miles is very considerable; for when the city of Denver is reached the traveller is already at an altitude of some five thousand feet above the level of the sea. Beyond towers the great wall,

the backbone of the continent — the Rocky Mountains.

Approached from the plain, at first such elevations as the summit of Pike's Peak are discernible on the horizon, appearing like miniature white tents, and later as marble domes surrounded by pinnacles and buttresses of alabaster. Shortly the region of the mountains below the snow-line appears, and ultimately the panorama of giant hills stretches from north to south as far as the eye can reach.

On the whole, like all great spectacles which have excited the imagination, the reality is at first sight disappointing, and the fact of attaining an elevation of five thousand feet before a view of the mountains is complete accounts for this. But with every later hour spent in contemplation the marvel grows. The early impression is evanescent ; and each day, with its new visions of color and form revealed in these mighty hills, adds to the sense of their majesty.

However, having viewed from the sea some of the mountains in the islands of the tropics, notably the Blue Mountain range of Jamaica, whose central peak towers eight thousand feet abruptly above the level of the ocean, such a mountain chain more fully realized my ideas of grandeur than did the mighty chain of the Rockies, whose loftiest peaks are nearly twice as high.

Arriving at Denver we spent a few days making preparations for the drive into the mountains. Our destination was about one hundred and fifty miles to the southwest, high up in the main chain of the Rocky Mountains, then only to be reached by stage or private conveyance.

Fourteen miles from the town of Leadville, at an elevation of nine thousand two hundred feet above the sea, surrounded by mountains, some of which attain an altitude of nearly fourteen thousand feet, are two small bodies of water, from their proximity to each other known as Twin Lakes. The smaller of these is a mile long, oval in shape, the larger one perhaps exceeding it three times in size. Here an early settler, by name Derry, had a hay ranch and summer grazing ground. A rude house of entertainment for hunters and fishermen was also maintained by this hospitable pioneer. There was no other habitation for miles; mountain peaks towered above it on every hand, framing an upland valley containing the Twin Lakes.

A word as to the house which the Derrys had built. It was a wooden structure, of course, but displayed in its construction not only the fertility of resource that is one of the attributes of the pioneer, but much of Yankee ingenuity. It was roofed entirely with tin, not in the conventional way, each separate plate having once been an in-

tegral part of a tin can, that indispensable adjunct of civilization and index of its advance. No single object more clearly indicates the invasion of a new country than the countless empty and abandoned tin cans scattered everywhere. But the Derrys did not surrender them as useless when empty; all were subjected to fire, and the part of each that had once been the cylinder now was a flat piece of tin again, firmly soldered to its neighbors of like origin, the whole forming an admirable water-tight roof. As this was no small house, the patience and labor involved in making such a covering can readily be imagined.

Four or five days were spent in Denver in finding a man who, besides having the necessary conveyance, also had such knowledge of the country as would enable him to pilot us to our journey's end. Finally such service was secured, and early one morning we began our slow journey in a traditional "prairie schooner" over what was then an almost virgin country.

I can but briefly indicate the many beauties which nature spread prodigally before us on every side. All along the way I recognized the birds that crossed the road in front of us or that alighted in the trees in the vicinity. They were the same that Mr. Allen had brought back from this region, and each one recalled my work in Cambridge. As I saw them now alive for the first time none

of them were strangers; no introduction was necessary, except as to song and action.

My previous journeys, even the one that had taken me to eastern Kansas, and also the winter spent at Panasofkee Lake, had not brought me into relation with a new set of conditions in bird life; I mean by this a different fauna, especially of small birds. There were a few new ones in eastern Kansas, but the general character of bird life at both that point and at Warrensburg, Missouri, was similar to that of the East. In Florida, taking out half a dozen large and conspicuous kinds, such as the herons, ibises, and wild turkeys, and among the small birds, the paroquets, there was little in the general aspect of the fauna very different from that of Princeton. Now I was passing through a country where another set of conditions predominated. The birds of eastern North America were few; strangers presented themselves on every hand.

Here was a bluebird of the finest azure both on his back and breast taking the place of our red-breasted bluebird of the East. Now and then the song of the mountain mocking-bird greeted the ear. In some of the streams we passed I saw for the first time the water-ouzel swimming, diving, and living its aquatic life. Yellow-headed blackbirds and Brewer's blackbirds were the representatives of that family; while Bullock's oriole replaced the

familiar Baltimore oriole of the East. Ravens were by no means uncommon, and magpies, conspicuous in every landscape where they occur, were frequently to be seen. Besides this, the highest altitude attained gave us a climate equivalent to that of Labrador in the summer; and such birds among the aquatic species as Wilson's snipe and the golden-eyed duck were both found and believed to breed at Twin Lakes. Great numbers of red cross-bills and Canada jays also indicated a bird fauna approximating that which is called the Hudsonian. The broad-tailed humming-bird, a larger and more conspicuous form than our rubythroat, was the only humming-bird observed, and was very abundant. All this to show how different and novel was the ensemble of bird life.

Throughout this drive the way was bedecked with flowers, and curiously we witnessed, not the phenomenon of spring turning into summer, which every one has enjoyed, but of summer really turning into spring, and spring again into summer, and summer again into spring. This paradox becomes clear when one realizes that in traversing this route from Denver to Twin Lakes, the way leads uphill and down, across considerable elevations, and culminates in the passage of the main chain of the mountains at a point a little over thirteen thousand feet above the sea.

When we left Denver on June 12, it was summer. The trees were in full leaf, and many of the early flowers of spring were faded and gone, their places taken by the later comers that decorated the summer landscape of the region. Beginning to ascend the mountains as the first foot-hills were attained, it was perceptible that each hundred feet of elevation had put the clock of nature backward. As the route passed over some considerable altitude, at first the leaves on the trees were only half developed; higher up they were just breaking the buds, and later, as the highest point was reached, only the haze that indicates the renewal of leaf and flower on the trees was visible. Along with this backward turning of the season one saw all the early spring flowers in various stages of growth inversely from the flowers to the bud about to blossom. There are other phenomena connected with life and growth, one of which I can suggest by a concrete example. There was a kind of sunflower blooming on all the foot-hills, and ordinarily the stock which carried the golden disk, some five inches across, was anywhere from four to five feet high. Gradually with the ascent of the backbone of the chain, the height of the stalks of the sunflowers was in inverse ratio to the altitude of the hills. That is, while the flower was five inches across in the lower regions, and on a stalk some four or five

feet high, before the snow-line was reached, at an altitude of perhaps twelve thousand feet, the stalk had dwindled to a sturdy stem, often not more than four or five inches tall, which bore a sun-flower in size and color quite equal to that seen on the tallest and sturdiest stalks below. The very short summer here did not admit of time to grow a longer stalk. The flower must be produced as soon as possible to allow the seed that would insure the perpetuation of the species to develop and ripen.

I cannot dwell on the many kinds of flowers, but to indicate their abundance as a whole seems essential. The ground was fairly carpeted, and up to within a few feet of the banks of snow at high altitudes their numbers did not diminish.

In the vicinity of Denver my attention was particularly attracted by a colony of burrowing owls. These creatures frequented, not only the deserted burrows of prairie-dogs, but also the abandoned domiciles of other animals, such as the badger and the red fox. Just to the east of the city, some four miles, was a very considerable prairie-dog town which probably covered a hundred acres, and there may have been one or more pair of the little rodents to each acre of ground. There were also many seemingly abandoned burrows. The whole colony of owls in this town did not exceed twenty pairs, scattered over the area.

They are droll little birds standing on the summit of the earth heaped at the mouth of a burrow. As you approach they begin to nod and gesticulate with their heads, bowing and seemingly much interested in the visit. This series of genuflexions is continued until a close approach is made, when the bird flies away with a rather slow, silent, flapping sort of flight, or more often disappears into the burrow beside the mound, like a jack-in-the-box. This habit of disappearance not only interested the human element in our party, but my setter Grouse, who accompanied us to Colorado, was equally impressed. He could not get used to it. That a bird standing on the ground should, in an instant, instead of taking flight, vanish into the bowels of the earth, was too much! He protested loudly whenever he witnessed the phenomenon.

A drive from Denver to this prairie-dog town served to introduce two other birds characteristic of the region. The mountain-plover, a species with something about it suggestive of the killdeer, but larger and of the build of the lapwing of Europe; and the prairie falcon recalling the peregrine, and in size about halfway between that bird and his miniature relative, the pigeon hawk.

"Just in the town itself are very many birds, doubtless attracted by the trees planted so liberally along the streets, and by the little streams of water that run along in what we

would call gutters in the East, but which here serve to keep alive and green the trees and grass that the dry soil and climate would soon kill were they left to nature's protection.

"Some of our readers will perhaps be glad to know that there is a large city in this country where the familiar sparrows are not known, and where their place is supplied by natural inhabitants, who, if not so abundant or conspicuous, seem to be able to keep the insect pests at bay ; for rarely have we seen more flourishing and thrifty trees, apparently free from all kinds of cutworms and the like that trouble us so much about our homes in the East. A week ago, in Chicago, we found the sparrows abundant, and their familiar chip, chip, chap, chap, brought New York streets vividly to our minds ; and passing through Kansas City the day after, in only a twenty minutes' stop, we detected, we thought, the same little fellows that throng our Eastern cities. But here, in Denver, we have not seen or heard an English sparrow, and as every now and then a bright oriole or gay flycatcher flashes by, with a strain of most beautiful song, or the weak, harsh notes that characterize the latter bird, we congratulate the citizens that their town birds are much more interesting and varied than ours at home. This morning, walking up one of the main streets, the familiar song of the robin was heard, and looking about we saw a superb male bird, apparently of very dark coloring, sitting on the chimney-top of one of the low houses that are a feature of the city. The song seemed to us richer and fuller than at home, and by far more musical, though we would not for a moment disparage that of the Eastern representative of the bird in question. Maybe, after hearing such a number of strange, and to us new songs for the past few days, this one, from its very familiarity, sounded doubly sweet. The robins do not seem at all common, and, as we said before, this is the only one we have heard singing about here, though we have seen a number of others. There is hardly a bird that one misses more than this, and we should be careful in protecting them about our

homes." — *The Country*, Vol. 2, No. 8, June 15, 1878. From contributed article by William E. D. Scott.

An incident of my collecting at Twin Lakes was the discovery of the first known nest of the ruby-crowned kinglet. Until now the method of breeding of this bird had been more or less a matter of conjecture, and the eggs had not been seen. From the paper cited in the appendix, I quote the following notes with regard to this little kinglet, and a description of the nest made at the time.

"One of the most common song-birds, and heard everywhere. On the 20th of June I saw a female fly to a pine tree with material in her bill for building a nest. On looking I found a nest nearly finished. On the 25th of June I took this nest with five fresh eggs, and the female showed signs of having incubated. I think no more eggs would have been laid. The nest is before me as I write, and presents the following peculiarities: It is semipensile, being suspended to the leaves of the pine, and to one small branch, much like the red-eyed vireo's nest. It is very large in proportion to the builder, and is made of the bark of sage-brush and of *green moss* very firmly twisted together, and forming a soft outer wall of from half to a full inch in thickness. This is lined with feathers and hair. The whole nest is very soft, and has the following dimensions: Four inches deep outside, three inches deep inside, three inches in diameter outside, and two inches at the top inside, but narrowing to an inch and a half at the bottom. On the outside it is as wide at the bottom as at the top, being in this respect like a Baltimore oriole's. It was placed at the very outermost twigs and leaves of the tree, about twelve feet from the ground. The eggs are five in number, of a dirty white color, faintly

spotted all over with light brown, which becomes quite definite at the larger end. They are large in proportion to the size of the bird, and one end is very little sharper than the other. The following are the dimensions: .55 × .45, .55 × .44, .54 × .42, .57 × .45, .58 × .43."

During our stay at Twin Lakes we went a number of times to Leadville, some fourteen miles away. A successful mining camp in embryo, situated in what had once been a famous gold placer, California Gulch, it presented a novel and remarkable spectacle. A camp, in the remote fastnesses of the mountains, with a few hundred inhabitants, grew, from the time of the melting of the snow in spring, to a city of fifteen thousand people ere, with the early fall, the first white flakes appeared betokening the coming winter. It was a city of canvas and wood, largely canvas. A mighty stream of adventurers of all kinds was flowing in daily. Miners and capitalists, gamblers and courtesans, preachers and actors, swelled the throng. With the virgin pine forests, at the edge of its streets and squares, fourteen steam sawmills were unable to supply the demand for lumber for building, and tents were conspicuous for the entire first year of this city's life.

Beside other woodpeckers, notably the red-shafted flicker and the type of yellow-bellied woodpecker prevalent in the West, the brown-headed woodpecker was common and bred at

Twin Lakes. The genus to which the yellow-bellied and brown-headed woodpeckers belong is known as *Sphyrapicus*. As an illustration of the artificiality of conventional systematic classification, it is worthy of record that almost until the time of which I am speaking the male and female of the brown-headed woodpecker not only had been described as separate species,—one known as the brown-headed woodpecker and the other as Williamson's woodpecker,—but the female, which presented a somewhat different character and coloring from the other members of the genus *Sphyrapicus*, had been placed in a genus by herself. This is not the only instance where sexual difference of little-known birds has caused systematists to describe the two sexes as different species.

During our stay at Twin Lakes in the month of July there occurred a total eclipse of the sun. This began, as nearly as I can remember, about two o'clock in the afternoon, about the height of day at that time of year.

Gradually darkness overspread the face of land and water. The birds abandoned the pursuit of their habitual occupations, and the preliminary song period that heralds the night commenced. As the eclipse proceeded, each feathered creature retired to some accustomed sleeping place, and went through all the motions and excitement that

occur with most song-birds just before darkness descends. The period of absolute obscurity of the eclipse was, of course, short. At this point not only the birds, but all nature seemed sleeping. With the beginning of dawn, from one point and another could be heard the cries and first calls preliminary to the opening chorus of song with which birds greet the day. The beauty of light, shade, and color which accompanied the procession of events throughout the duration of the eclipse were impressive, wonderful, magnificent. The picture of a single line of incidents, such as I have portrayed through the medium of birds, indicates but a little of the greatness of the event viewed as a whole.

For those who are not so fortunate as to witness the song phenomenon which I have described as accompanying the obscuration of the sun, I suggest that every June day furnishes at its beginning and close a parallel. He who would enjoy the opening should be out of doors at, say, half-past two in the morning, and sit for the next twenty minutes in the unbroken stillness and dark of the time. It will be difficult to say when the day begins, where the blackness ends and fades into the first gray which betokens the dawn; but coincident with it a low cry from some thicket or tree hard by will announce a perception more acute. Presently answering calls

come from every direction, mingling and swelling, until perhaps the song of a robin bursts in its full melody upon the hearer. Gradually all the minstrels join, until, as the first streak of gold illuminates the horizon, it is possible to realize something of the multitude of throats which unite in the chorus.

Such a symphony attains its greatest volume about the time the sun is an hour high, and from then until ten o'clock in the morning gradually and imperceptibly dies again until one begins to notice single and individualized songsters. Finally the hush that heralds the interval of noon, that is, from eleven o'clock until three on a hot summer's day, is complete.

Leaving Twin Lakes after a stay of some six weeks, we proceeded by another route out of the mountains, through the Ute Pass to Colorado Springs. I can allude only to a few days spent at the latter place. A visit to the Garden of the Gods, where, for the first time, I saw the white-bellied swift breeding in the crannies of the monuments, towers, and cliffs of this fitly-named park, suggested that, before the advent of houses, his kinsman, the chimney-swift, probably took advantage of similar sites for building nests and rearing young. Perhaps it is necessary to be more explicit.

Obviously three hundred years ago the chim-

ney-swift of North America could not have bred in chimneys, for probably there were none. The fact that the civilization and settlement of a new country can so radically affect all the representatives of a given kind of bird as to change its breeding habits, at least so far as its disposition of the nest is concerned, is suggestive.

An agreeable recollection of the brief stay we made at Colorado Springs is a pleasant acquaintance formed with Mr. and Mrs. Jackson, which added a new interest, if that were needed, to the graphic and picturesque descriptions of the West and Western life, which Mrs. Jackson, as "H. H." gave to the world.

Presently we were again crossing the plains; and in a little time the pleasures of the summer were retrospects, while the tangible results of the work accomplished on this expedition were apparent in the additions (some seven hundred birds in all) to the collections of the growing museum.

During the succeeding university year, that of 1878 and 1879, my work kept me in Princeton. It was the regular, routine kind, consisting of my duties as curator of the museum, instruction to special students, of whom I had several this year, and a course of lectures and laboratory work on comparative anatomy of vertebrate animals.

It is my purpose to discuss briefly at this point some of the conditions that existed in the bird

life of Princeton in the years from 1875 to 1881, and to compare them with those of to-day.

Most of us are aware that the fauna and flora of a given region is liable to slow and gradual change. Perhaps few of us realize how rapid and radical such development may become. Sometimes this is effected by the adventitious aid of man, a good example of which is the introduction of the English sparrow into North America. More recently the starling has been naturalized, and has become plentiful in the immediate vicinity of New York City as a wild bird.

The stories of our earlier observers dwell upon the abundance of the wild turkey throughout all eastern North America, and of the heath-hen at various points in the same region. Except in remote and unsettled districts the wild turkey has disappeared as a part of bird life, and the heath-hen exists only in limited numbers on the island of Martha's Vineyard. These are examples of the kind of change indicated.

I have spoken of the wild pigeons that bred in the vicinity of Mount Auburn Cemetery in Cambridge during my college days. One of the notable features of bird life in the vicinity of Princeton which attracted my attention were the spring and fall flights of the passenger-pigeon. Very considerable colonies also nested in the woods along the ridge known as Rocky Hill. In those days

most sportsmen in late September and October took advantage of the well-known migrations of pigeons. Many were taken with the gun. In addition, a number of the older farmers living along the ridge used annually, in the early seventies, to net pigeons in their fall flight. The method by which this was accomplished is too well known to be dealt with in detail.

In the years of 1875 and 1876, in company with Charlie Hubbard, I went regularly every autumn to trap the birds in this way. In the autumn of 1876 a single fall of the net resulted in obtaining upward of forty birds. This detail is given to show how common this bird was at so recent a date in New Jersey.

At Ithaca, during my stay at Cornell, I witnessed large flights of passenger-pigeons, and in Virginia, in 1872, enormous flocks feasted on the beech mast of the forest, as they passed through each season. At present I think it is safe to say that no wild pigeons have been observed in the vicinity of Princeton for at least twelve or fourteen years. They disappeared from Cambridge much earlier.

So far as we know, this disappearance has affected a wide area in eastern North America; and the only point in the region where the passenger-pigeon still exists and breeds in numbers is in the state of Michigan.

Among the small birds that were once plentiful and are now practically unknown, is the black-throated bunting. This bird was formerly of local distribution, and common from the Middle States southward. In my early collecting about Princeton, the presence of black-throated buntings was regular, but even then the number of representatives was not large.

The wood-duck and the Bartramian sandpiper formerly bred commonly in the region. On my first trips up and down the Millstone River, broods of wood-ducks were to be surely reckoned on, and the Bartramian sandpiper was abundant, breeding in all suitable large grass fields. Both birds still occur in limited numbers as migrants, and a few may rarely breed. It is clear, therefore, that a change has been in progress during appreciable time, and is going on even at the present.

Manifestly the extermination of a bird like the great auk, which did not possess the power of flight, and which afforded to the seamen and explorers of early days fresh food in abundance, was an event largely due to the direct acts of human beings. That a bird like the Labrador duck should, within the last fifty years, have disappeared from the bird life of America, is not only remarkable, but not so easily explained. The history of the disappearance and some data concerning the former occurrences of this duck

are well set forth in recent papers dealing with the subject.

The latest known living specimen was killed in Halifax Harbor in the autumn of 1852, and it is supposed that three others were obtained between that time and 1861. It is even rumored that as late as 1878 individuals were captured. The late George N. Lawrence of New York told me that along about 1840 the Labrador duck was exposed every winter for sale in Fulton Market, New York, among other examples of sea-ducks. Mr. Akhurst, a taxidermist of Brooklyn, New York, has also related to me that between the years 1848 and 1850 he obtained several specimens at different times which he shipped to naturalists and collectors in England and Germany; that it was not especially rare at the time, and that no one then apprehended that the career of this species was so near its termination. It must be taken into account that the Labrador duck, moreover, possessed great powers of flight, being a migratory species which appeared regularly in the waters about Long Island and on the coast of New England, every winter. Besides, it was so common that it was often found, as has been shown, in the game bags of the gunners who hunted for the market in those days.

Allowing the possibility of individuals occurring even as late as 1878, they are certainly the last

ones known; and hence the present generation is contemporary with the termination of a given kind of bird.

Now, there are many other kinds of sea-ducks of similar migratory habits to the one under consideration, notably the different species of eider-duck, and the various birds classed under the head of surf-ducks or coots, not to mention the old squaws, the golden eye, and their allies. It therefore does not seem probable that by any influence exerted by men, and certainly not the efforts of game- and pot-hunters, was the extermination of this species accomplished. Such a result must be inevitable to aggregations of individuals of a given kind to which we apply the term "species." They have their beginning, their rise and culmination, and their end, much as is the case with nations, to which they may be likened. The point which I wish to emphasize here is that the process of organic evolution is not something of the past; the present period is as much concerned with it as any, and the above facts are recited to show that, under our very eyes, something that most of us look upon as a remote force, which had its chief action in the early history of the world, is still potent, and carries on its work now. In short, species originate and disappear to-day just as they have always done. I said "originate," and I shall presently,

in the course of this narrative, give the history of what I believe is the birth of a species of wild song-bird within the past fifty years. Our first knowledge of it, how long the type was solitary, how rarely it was duplicated, how it became more common, and how readily any good field-naturalist may go forth almost at our doorsteps and observe it to-day, all will be related.

Now, the facts with regard to the changes which I have exemplified by details bearing on the bird fauna of the vicinity of Princeton, are simply some of the steps in the evolution of the several species mentioned. It must be borne in mind that evolution does not necessarily mean growth; it does not necessarily mean betterment, but may as frequently mean decadence and degeneration. Nor must the reader consider for a moment that a pessimistic point of view is to be founded on the generalizations which I have tried to substantiate. Listen to the other side.

It is beyond debate that the wood-thrush, one of the most lovable, charming, and dignified song-birds, has vastly increased in proportion during the last fifty years; that its habits have been so far modified that, while it was once a bird of the deep forest, whence its name, it is now common in every rural town in the vicinity of New York, and its song is more frequent in Central Park, in the

proper season, than it was in the deep forest in the days of Wilson and Audubon.

The increase during the last fifteen years of the robin and meadow-lark in the bird-world of the vicinity of Princeton is noticeable.

Writing this, sitting under the trees on the edge of the village, I can hear hosts of bobolinks frolicking over the fields close by. In my early Princeton collecting I regarded the bobolink as an uncommon breeding bird. In the field from which the singing comes at least fifty pair breed annually.

Another bird which appears to have increased greatly in numbers during the past twenty years is the Baltimore oriole. The orchard orioles have always been during my experience common throughout the migration and breeding season. The grace and beauty of their form and color enlivened every hedge-row, and their song was ever present to charm the ear. It was otherwise with the Baltimores; they were in the category of the bobolink. Yet to-day almost every yard has its pair which nest and rear a brood; and over the very streets, when the leaves are fallen in the autumn, numbers of nests of the last season are to be seen. Surely all this justifies an optimistic rather than a pessimistic view.

In concluding this part of the narrative, I wish to dwell for a moment on the bird known as

Brewster's warbler. The type specimen was taken by Mr. William Brewster at Newtonville, Massachusetts, May 18th, 1870. It was not until some six years later, April, 1876, that the bird was described and named by Mr. Brewster. During this long interval it was one of many birds in his private collection; and while he and other young naturalists who visited him recognized that it was like no other bird, yet it appeared, on the whole, to be something like a female golden-winged warbler. However, it was at last given a name. This naturally attracted a wider attention than had the solitary specimen in the cabinet. On May 12, 1877, Mr. Christopher Wood killed the second recorded specimen at Clifton, Pennsylvania. Like the first it proved to be a male, and was almost identical with the type in appearance. The third recorded individual was killed long before either of the others. It was found in the collection of the Philadelphia Academy of Sciences, labelled "J. C., 20 October, 1862." It had no other history, but it must have been at one time in the collection of John Cassin, Esq., for the label is in his handwriting. As the years rolled on the birds were collected in numbers, until in October, 1885, twenty-two had been recorded. From that time the records have increased, and there are now something considerably over a hundred of

these birds in different collections. In certain regions, notably at Englewood, New Jersey, and in parts of southern Connecticut, they may be seen every year during the breeding season with certainty. Every good naturalist who has worked recently in the lower Hudson River valley has met with some of these birds. So it is a tangible part of the fauna of eastern North America now, and its presence can be readily detected in given localities at definite times of the year.

It does not seem probable that a form so common as this, and ranging over as large an area as from Pennsylvania to Massachusetts, should have remained unknown to our earlier ornithologists: such keen field-naturalists as Audubon and Wilson, Baird, Cassin and Lawrence, Coues and Prentiss. Nuttall made careful and prolonged study of birds in the region where Mr. Brewster's type was collected. Yet none of these close observers and good collectors either recorded or collected this bird. The presumption is that the birds could not have been so common early in the nineteenth century as they are now, if they were represented at all at that time. Nor does it seem that either the theories of hybridity, or that of dichromatism, are sufficient to account for this kind of bird. Fertile hybrids are practically unknown either in wild or domesticated birds.

That many good field-ornithologists declare that they have seen Brewster's warbler attending to young seems an answer in itself to the hypothesis of hybridity, did not the *number* of individuals in themselves controvert such a premise. Hybrids do occur among wild birds, but are casual.

If then it is conceded that it is improbable that over a hundred cases of wild hybridity have been recorded between the golden-winged and blue-winged warbler, the dichroic hypothesis remains. Granted that this bird and the other two are all one kind with several dichroic phases, this particular example of the dichromatism, which is now of measurable occurrence and quantity, apparently did not occur at all early in the last century, was not secured until 1862, not recognized till 1875, and from that time on has grown in a geometrical ratio. That may be, but I am more inclined to believe that in Brewster's warbler we have the beginning of a new form of organic life. That such forms, especially when based on external color, should present wide individual variation in their early history seems probable. Brewster's warbler does show such variation. That a long period must elapse before the bird's standard of appearances becomes fixed so as to be within the conventional limits of variation observable in well-defined forms, seems obvious.

It is on this series of facts and arguments that I have assumed the position, and felt warranted in making the statement, that in the last fifty years a new kind or species of wild song-bird has originated.

CHAPTER VII

FLORIDA: THE GULF COAST

THE fall of 1878 and the following winter was spent in building up the museum collections in general, and in adding the material obtained in Colorado to that already on exhibition.

During the summer of 1879 I passed some time at Ithaca, securing birds of that locality for the growing collection. During this vacation a second trip to Florida was planned, particularly to examine the bird fauna of the Gulf coast of that region. This expedition was carried on largely through the assistance of Andrew E. Douglass, Esq., of New York, who was desirous of having certain ethnological investigations made in the region in question. He wished to locate definitely some of the burial mounds of the ancient inhabitants of Florida, and to have one or two of these explored with a view to obtain, not only the implements of the aborigines, but, if possible, crania and other parts of the skeleton.

The month of September was spent largely in preparations for the proposed expedition.

Through the courtesy of the Quartermaster-general, the State of New Jersey furnished several wall tents, and an array of army blankets and other paraphernalia suitable for camping. About to invade a region regarding which little information could be gained, the necessity of being independent was apparent. Therefore, in addition to this camping apparatus substantial portable staples in the way of food were a part of the equipment. The personnel of the party consisted of Mrs. Scott, myself, and a young man, James Henry Devereux, who had formerly been a student in the college and who volunteered to go as my assistant. In addition there was Mary Mason, capable of administering the domestic economy of either camp or house. Nor must Grouse be forgotten; he was one of the important members of the party.

We left New York by steamer for Jacksonville about the 10th of October, and after a somewhat stormy passage reached that port. An incident of this part of the journey seems worthy of record.

I said that the voyage was somewhat stormy. When off Cape Hatteras the traditional gale of wind associated with that part of the coast was encountered. On embarking in New York I was informed, as was to be expected, that Grouse could not be allowed to go above decks on any pretence. He was at once taken in charge by a

steward, who locked him up in a room in the hold, where he assured me the dog would be safe and well looked after. Our staterooms were on the hurricane-deck. Mr. Devereux, my assistant, occupied a cabin with me, and the other two were near by. These cabins were entered by doors opening on deck. During the height of the gale off Cape Hatteras, when the wind and rain together were making an uproar, to which was added the creaking and groaning of the ship and laboring of the engine, Mr. Devereux and I were awakened (it took little to arouse us) by a scratching at the door of the stateroom. It was Grouse; and getting up and opening the door, he was discovered in a drenched condition, but overjoyed to have found his friends. The point to be emphasized is the fact that this dog was travelling for the first time on board a steamer. He had never been on a large vessel before, for his former trip to Florida had been by rail. He was not allowed to do more than cross the steamer's gangplank when he was taken by the steward and confined below. In order to reach my stateroom he had either to ascend various stairways in the interior of the ship and pass through the cabins and so escape to the upper deck, or to climb up the semi-stairlike ladders that connected the three decks on the outside. He probably followed this latter course. Moreover, in all the tumult and

strangeness he selected my room though other of his friends were quartered close by.

To this day the details of his trip, or how he escaped from the place where he was shut up, are a mystery. The whole affair, however, becoming known, caused much comment among the officers and passengers, and finally came to the ears of the captain. After breakfast the next morning, he said to me: "Mr. Scott, that's a clever dog of yours. I don't think such a dog need be under restraint, and I wish to extend to him the liberty of the ship." From that time until Florida was reached Grouse sat at the captain's table and enjoyed all the privileges of a first-class passenger, and many more.

The journey from Jacksonville was to Ocala, a town some five miles from the headwaters of the Ocklawaha River at Silver Spring. Therefore, the first part of the route was familiar.

I had pictured the Ocklawaha as it appeared four years earlier, and had excited the imagination of the other members of the party by stories of the birds, the alligators, and the charm and novelty of the trip. Confident of a great pleasure in store for us all, I did not dream that any change could have taken place in the short time which had elapsed. However, the first few miles of the winding waterway, after leaving Palatka, was marked by wide and radical difference in the conditions, and

the remaining days' and nights' journey on the river fully confirmed the impression of the first few miles.

There was little or no bird life of any kind, and such as occurred was confined almost entirely to small, inconspicuous land-species. Now and then a frightened heron would fly croaking away as the boat turned some bend in the river, or a water-turkey would drop scared from his perch into the water, diving to escape further notice. No groups of ibises, no flocks of paroquets, no droves of wild turkeys, enlivened either the trees or shores. Only one or two alligators were seen, and but a glimpse of these was obtained as they hastily sought the water when the steamer was afar off. Such conditions had resulted from the almost universal practice of the passengers on these steamers of shooting at everything alive. It had taken only four seasons to drive away from one of the most crowded bird districts it has ever been my fortune to see almost its entire avian population, certainly its most conspicuous elements.

Inquiry among the crew of the boat who were accustomed to make the passage frequently—once or twice a week—revealed all this, and while they deplored it, they were disposed to blame the birds and other animals that were frightened away, rather than to censure the travellers who had produced this lamentable end. The

captain too explained to me that it was really a serious drawback, in a business way. People had formerly taken the trip simply for the shooting, and this being destroyed, many no longer patronized the route. So our journey began with disillusion and disappointment.

Arriving at Silver Spring, and proceeding to the adjacent town of Ocala, I at once set about looking for means of transit across the state to the Gulf Coast. While no definite spot as a headquarters for the coming winter's work had been selected, I was anxious to begin my investigations in the country near the mouth of the Withlacoochee River, which finds its source in Sumter County, and one of whose main tributaries flows from Panasofkee Lake where I had collected in the winter of 1875 and 1876. After some two days' negotiations I succeeded in making arrangements for freight wagons and, in addition, a covered spring trap to convey the passengers. We were about to go into a country where there were few houses, and where the roads were but obscure tracks through the forest, so I attempted to provide for all sorts of emergencies; grain and fodder and extra shoes for the horses, leather to mend harness, ropes, axes, and other tools.

The procession started from Ocala early one morning, and most of the inhabitants of the town were out to see its departure. First came a freight

wagon driven by an ebony negro known as Black Tom, who professed to have a thorough knowledge of the route to our destination. This was encouraging, as I was not at all sure where it might be. This wagon was loaded with trunks and army chests, a portable canvas boat, and tents. The second vehicle of the cavalcade, also devoted to baggage, was driven by another negro, distinguished from the pioneer driver as Yellow Tom, his color rendering that name fitting. The passengers brought up the rear, our driver, a negro boy, rejoicing in the name of Amaziah.

Black Tom, Yellow Tom, and Amaziah, for the next three or four days were words much in our mouths, and came to be part of the household vocabulary. The whole thing impressed these darkies as the greatest possible frolic next to a circus, and it would be interesting psychologically to know more in detail their understanding of the affair. Presumably they believed us all to be millionnaires who did not know what to do with our money, and who were out for a good time. Tourists were not common in that part of Florida in those days; from October until April, when we left the Gulf Coast, we encountered only a single individual besides our own party who might possibly be included in that category.

The journey across the state to the Gulf can only be touched on. The way led through long

stretches of pine forest,—a seeming procession of trees. This was varied by "bayheads" and "cypresses" which indicated streams of greater or less extent, down whose steep banks we plunged into fords of all grades of difficulty. The road was, after the first few miles, always in doubt. Often it appeared to lead nowhere. On such occasions Black Tom, Yellow Tom, and Amaziah each accused the other of losing the way. These lengthy and often heated discussions consumed valuable time, and had to be summarily suppressed by the powers in authority. Sometimes at noon or during the night (for we were two nights on the way) a horse was lost, which involved tedious delay and much chatter on the part of the three. Sometimes a break in the harness afforded opportunity to make short excursions in the vicinity while the damage was repaired. In short, every kind of petty accident conceivable happened, yet the trip was enjoyable, and the humor of the situation generally compensated for all annoyance.

Finally, on the afternoon of the third day, when a certain sense of indefiniteness and discouragement was beginning to manifest itself in various ways, we encountered a horseman, one of the first persons we had seen since leaving Ocala. He was of a magnificent physique, broad-shouldered, with a mighty chest; a sturdy and resolute-looking per-

son with a commanding air, differing entirely from the cadaverous white of the region, "the piney woods cracker." His brown hair was beginning to be thin on top, and was somewhat silvered with streaks of gray, as was the flowing beard whose luxuriance almost concealed the chest beneath. The horse he rode was, like the man, well kept, well groomed, and mettlesome. He reined in his horse, and was greeted by Black Tom as Dr. H——. Before leaving Ocala I had been assured that there was a magnate living on an island somewhere near the mouth of the Withlacoochee who possessed riches untold in lands and moneys, and who, in addition to his own house, had several other dwellings on his extensive estate. From my former experience in Florida and my knowledge of the condition of affairs generally existing throughout the region, I of course took all this with a grain of salt.

However, here was the doctor, and so much of the story was true. He appeared a genial gentleman, and ascertaining our desires and hopes, comprehended the situation almost instantly. He gave us some brief directions, excusing himself for not accompanying us, as his business took him in another direction and was imperative. We could rest that night, he told us, at the house of a friend of his, General C——, where we would find all possible hospitality by mentioning his name.

He gave us explicit, though to all save the darkies obscure, directions how to reach the place, some seven or eight miles distant. It was only a few miles from our ultimate destination, for he told us that he had on a little island, not far from his own dwelling, a small house which he thought would answer, especially when he learned that we were amply supplied with tents. The whole interview did not occupy much longer than it takes in telling. The doctor vanished into the pine woods, and we resumed our journey. Eight miles did not seem far to travel, but with heavy freight wagons, slow walking, tired horses, and dispirited drivers (for by this time the novelty had begun to wear off), it was night, and some time after, a slow, drizzling rain was falling, when we were made aware by shouts from Black Tom, who was lost in the darkness ahead, and by the barking of dogs, that we had reached our destination.

A cordial welcome to his lonely cottage was extended to us by General C——, a retired veteran of the Mexican and Seminole wars, whose fortunes had led him to this remote wilderness as the home of his old age. We sat far into the night before the blazing pine-knot fire talking on many themes. The general was eager for human intercourse and an opportunity to talk of the world's past and present affairs. His look and bearing was that of a Huguenot of noble birth, and he may well

have been, as his name indicates, a descendant of one of the refugees, who at the Revocation of the Edict of Nantes sought asylum in Florida. All our current literature, papers and magazines, we gladly left with our kind host, to whom they were a gift of price. On parting in the early morning we mutually promised to keep up neighborly relations during the coming months.

General C——'s place was at the head of a bayou which led out to the waters of the Gulf, and we found that by this waterway we could reach our destination more quickly than by land. So in the morning Black Tom and Yellow Tom with the two freight wagons, and Amaziah with the empty carriage, now containing only some hand baggage, were sent on their way. The rest of the party, including Grouse, embarked in the portable boat which had just been unpacked. This boat was some seventeen feet long, had a beam of four feet, and a capacity for carrying nearly a thousand pounds, so that four persons and a dog were not a great load for it. I speak of it as a portable boat. It was made of waterproof canvas stretched on a very light, tough, wood frame, and was so constructed that when not in use it could be shut up like an accordion and put into a box not quite as large as an ordinary travelling trunk. It was a nondescript, and we named it then and there the "Bandersnatch."

Now, when the three darkies saw us take from the trunk what appeared to be a bundle of canvas, stretch it out, and by the use of a few wooden frames and bolts convert it in a few minutes into a boat, in which we embarked and rowed away down the bayou, their wonder could not find expression. The stories they told of that part of their adventures when they returned to Ocala I think must have become a part of the legendary history of the place, as I have frequently had it recited to me in different forms by various darkies and white men at intervals for years, and as each year rolled by the miracle grew in magnitude.

The place where we reached the Gulf was about three miles north of the mouth of the Withlacoochee River. The coast-line is not definite at this point; perhaps this will be realized as the narrative proceeds. Many bayous, having the appearance of streams or rivers, reach back into the swamps and pine woods which border the Gulf, and their entrance into the country is guarded by numerous small islands that form a picturesque element in the scene.

One of these islands, half a mile from the doctor's place, belonged to one Parson Gigger, who had built here a small house. The reason for the absence of the parson was carefully explained in detail, but I am inclined to the hypothesis that the mysterious Gigger was a solar myth. The

doctor told me he was in charge of the place, and that I could rent it for a reasonable price; which, after a short negotiation, resulted in our moving to what we called Gigger's Island, where we resided until some time after the first of the next January.

The little island was covered with a dense growth of cabbage palmetto which concealed in its shade a tiny house of three rooms, and a cistern—a wooden tank to catch water from the roof, for there was no fresh water on the island or in the vicinity—of dimensions almost as great as the house. With the large wall tents and other conveniences soon a comfortable dwelling and commodious working establishment was completed. Then began the labor to which all this effort had been preliminary.

The prosaic name "Gigger's" could not be tolerated by Mrs. Scott, who straightway called our romantic retreat "Halcyon Island." This title was suggested both by the peaceful calm of our solitude, and the constant presence of the belted kingfisher, whose point of vantage was the top-most bough of the live-oak, or the summit of a tall palmetto. From these heights the waters surrounding the island were commanded by the kingfisher's keen sight; small fry had little chance of escape when he pleased to swoop down on them. The gray Spanish moss draped the branches of the oaks; clumps of dwarf palmetto

gave decorative effect to the foreground. The spicy bay fringed the abrupt banks, close to which schools of sportive porpoise came to roll about and frolic in the shoal waters.

Housekeeping was carried on in true camp fashion, though we were not without many conveniences often lacking in the wilderness. A good cooking stove lessened greatly Mary's labors, but thereby deprived us of the picturesque in the shape of Dutch oven and camp fire. Fish and crabs of the best were always to be had for the catching, oysters of the coon variety grew near the dock, game was easily obtainable. Our own stores had among their contents a large supply of olive oil, a generous quantity of chocolate Menier, and barrels of pilot bread. Onions and potatoes were vegetables always to be had at Cedar Keys. On our return after a long day of exploration in the Bandersnatch, a savory fish chowder, a broiled redfish, or a game pie awaited us, flanked by a heaping bowl of potato salad. Another favorite dish was scouse, made of crisp pilot bread soaked in boiling water, and spread with butter.

Life in the open, exercise in rowing and sailing, hunting, swimming, and fishing, insured good digestion and an appreciation of simple food. Grouse alone rebelled; he had no fondness for a vegetarian diet, relieved only by fish which he despised and game never to be indulged

in by a well-trained hunting dog. At last a day came when a baked ham appeared on the dinner table. Grouse was given a morsel or two, but his carnivorous longings were unappeased. The same evening he came into the sitting room looking crestfallen and dejected, gave a low bark to attract my attention, and then ran to the door. I understood his meaning; he wanted me to go with him. I followed out of the house. He led me across the island in the moonlight, and showed me the ham lying on a fallen palmetto leaf. He had stolen it, but his conscience would not permit him to eat it, hungry as he was. His attitude expressed both humiliation, penitence, and a longing for forgiveness. He could not keep his secret.

Until now my studies of the birds of Florida had been confined to the interior, and while aquatic birds were abundant, they were such as are associated with fresh water. Now truly marine birds predominated. Almost at once I became acquainted with brown pelicans, royal and Foster's terns, double-crested cormorants, while ducks of many kinds were conspicuous. Among these I may mention buff-breasted and hooded mergansers, widgeons, pintails, blue-winged teals, and mallards. In addition the vast palmetto and cedar swamps of the mainland hard by afforded excellent collecting ground for such land-birds as characterize this part of Florida. Two kinds of

vultures, the turkey-buzzard and the black buzzard, were always to be seen in numbers; and among the birds of prey, the bald eagle was an important as well as imposing figure. Many eagles bred in the region, and of the two nests in sight of our house on the little island, one was close by.

Most of us associate the breeding of birds with the awakening of nature, with the coming of the springtime, the green grass, the early flowers, and the fresh foliage of the trees. We arrived in this part of Florida late in October, and on the 10th of November I saw the eagles repairing their nests, for they use the same ones if undisturbed for generations. Late in the month the first eggs were laid, and by Christmas there were young in the nest. So that any preconceived notions as to the breeding time of birds, such as I have indicated, needs some modification.

Even in the North, the facts warrant this generalization. Has any one associated the month of February in Princeton or the vicinity of New York with the breeding of birds? And yet every year the great-horned owls build their nests and lay their eggs by the 20th of February on Rocky Hill, back of Princeton. The woodcock is not far behind on the lowlands. I have tracked these birds to their nesting place by the imprints of their feet in the snow.

One of the latest birds to breed about Prince-

ton is the goldfinch, or yellowbird. Nests late in August are the rule, and I have found fresh eggs during the first week in September and young ones just ready to leave the nest on the 20th of that month. So that while doubtless the great wave of reproduction in bird life, which we call the breeding season, does occur in May and June, more than half the year is occupied by various species of birds in breeding near New York. Really but four months are without nesting birds. The farther north one goes the shorter is the breeding time, and the reason is evident. As the equator is approached the reverse is true. It is only necessary to stay a short time in Florida to become aware that there is no definite season associated with the time of reproduction. After some twelve different winters and a consecutive period of eighteen months spent in the state, I feel warranted in saying that it is possible to find birds nesting during every month of the year.

The fish crow was a common bird observed in large flocks all about the region at the mouth of the Withlacoochee River. The fruit of the cabbage palmetto attracted them in enormous numbers, and great bands of these miniatures of the crow of the North, a hundred and even more together, made a very gay scene as they descended on the palms and with much vociferation and crow gabble proceeded to enjoy themselves.

Here, too, were countless numbers of the so-called shore-birds passing the winter season after the long journey from their northern breeding grounds. Long-billed curlews, marble godwits, willets, both kinds of dowitcher, turnstones, oyster-catchers, black-bellied plovers, ring-necked plovers, piping plovers, least sandpipers, semipalmated sandpipers, dunlins, and sanderlings, formed a heterogeneous company. At low tide, with the exposure of the oyster bars and sand beaches, they were scattered over large areas, but even then their number was evident. At high tide, when they resorted to such small spaces as the water left uncovered, they were crowded so close in masses as fairly to touch one another. At midday under these conditions such flocks presented a novel sight. Approached quietly in a boat all might be seen in repose. The greater number were fast asleep, many with heads beneath their wings. When within twenty yards some of the more wakeful uttered a low series of gurgling, warning cries. Presently there was much stretching of necks and legs and preliminary shakings of wings, followed by a vast flight of birds as the boat almost touched the reef on which they had been resting.

I must not forget to mention the abundance of small birds; marsh-wrens, seaside and sharp-tailed finches were present wherever the sedge-

grasses grew, localities that were also frequented by large salt-water rails. Our island, small as it was, had its pair of mocking-birds. Great numbers of boat-tailed grackles and red-winged blackbirds as well as the crow blackbirds were present in the vicinity of the shore, and might often be seen feeding on the beaches and oyster bars exposed by the receding tide. Cardinals and cheewinks, bluebirds, titmice, and nuthatches thronged in the pine woods, especially in the vicinity of the bay-heads. Golden-crowned and water thrushes were uncommon. Piney-wood and yellow-winged sparrows were abundant in the undergrowth of the pine forests, and once I detected Henslow's bunting.

Here, too, the trees were frequented by many woodpeckers. Florida is particularly rich in these birds. The red-cockaded, red-bellied, downy, hairy, and red-headed, as well as pileated woodpeckers and flickers were to be seen in great numbers at almost any time, and the ivory-bill was by no means rare.

About the shores herons strode with much deliberation and dignity. The larger sorts, were solitary in habit; the smaller varieties were not only gregarious, but the band was often composed of the several different forms found here. When feeding, these parties were frequently accompanied by flocks of ducks, who swam in the shallow

waters where the herons waded, and kept just behind, but followed close.

Here the swallows surely did not hibernate. Four kinds were present in numbers. Tree and barn swallows were perhaps the more frequent, but the purple martin and bank swallow were constantly seen. Over the golden waterways they flew and dipped with no seeming thought of retreat to the shelter of the ooze at the bottom of ice-covered ponds in the North.

Late fall in Florida has a prolonged period of Indian summer. Day after day may be described as "golden." The waters of the Gulf lie unrippled by a breeze, the sunsets are unmarked by clouds. In the late afternoon, as the red orb dipped into the Gulf on the western horizon, occurred a remarkable phenomenon. The stillness and the light and color on the water seemed in accord with the placid mood of the sea and air. Then, seemingly, far out in the west, from the place "where the sun went down," came a strange medley of sound. The puffing of schools of porpoises, the rush of the leviathan in pursuit of his finny prey, was mingled with the weird laugh of loons, the gabble of hosts of gulls, and sometimes the shrill cry of a single tern; the splash of the brown pelican as he struck the water, and countless unknown sounds and noises that seemed to come from a given point, together produced the

impression of a vast commotion created by myriads of living creatures. Added to the whole was an air of mystery that was one of its charms. Again and again we rowed in a boat toward the setting sun far out into the Gulf to discover, if we could, the beginning of this chaos of sound, to find the outposts of the throng who joined in such a chorus. These excursions were futile; the farther we went, so far the aggregate of noise travelled beyond us. The mystery was always just under the setting sun !

The town of Cedar Keys was some thirty miles to the north of us on the Gulf, and at this time and for years before this port had been the scene of great commercial activity, based almost entirely on the exportation of cedar logs, the wood of which was used in the manufacture of lead pencils. The Fabers and all the great foreign and American houses had agents at Cedar Keys, and thither were taken for reshipment the cargoes of cedar logs collected from the swamps of the adjacent Gulf Coast.

The poor whites of this region presented many curious and unaccountable phases of ignorance. Shortly after my arrival I offered a stipulated price for certain birds such as the ivory-billed woodpecker, and at first I obtained some specimens, but later such people as I could get to do this sort of thing for me refused, or excused them-

selves from undertaking it; generally the latter. One day one of them, more frank than the rest, told me that it had become common gossip that I was not paying a fair market price for birds, especially the ivory-bills; that I took them North and sold the ivory of which the bill was composed for fabulous prices, and was simply playing on the credulity of the people whom I paid a small price for obtaining them.

Before passing on to other matters I must delay for a moment to dwell on the ethnological work I had undertaken for Mr. Douglass. Very soon after my arrival I made inquiries as to the location of the "Indian Mounds," as they were called, and found several were near at hand. One of these was about three miles from the mouth of the river on the bank, and I determined to make a detailed investigation of part of it at least. For two days of each week during the stay at Gigger's Island, Mr. Devereux and I worked in excavating and removing the sand, beginning at one end of this mound. We procured an admirable series of crania, many interesting fragments of pottery, and some vessels and dishes almost entire, as well as bone and flint implements in considerable numbers. These were all ultimately shipped to Mr. Douglass and became part of his admirable collection which he finally presented to the American Museum in Central Park.

This ethnological work and zoological collecting occupied us constantly until the third week in January, when I determined, for various reasons, to proceed farther southward. There are a number of events connected with my work and residence here that I have not recorded, such as the collecting of porpoises for their skeletons, and the search for the absolute mouth of the river, many fishing parties, and constant trips to procure supplies of fresh water, for it did not rain during the time we were on this island. Almost every day was cloudless, the cycles of sunshine were continuous.

Chartering a small schooner at Cedar Keys, whose skipper was familiar with the little towns and settlements of the Gulf Coast, all the collections and impedimenta were duly loaded, a most heterogeneous cargo. Everything being ready, one morning we sailed away southward. The collections were stored below, taking most of the available space. Cots, tents, rocking-chairs, and kitchen utensils littered the deck, which so loaded afforded scant room for the passengers. When we reached the open Gulf, where the sea was running, Mary, our faithful maid and friend, was tied fast to the mast, that she might not roll over the low bulwarks, for in smoothest water she was the prostrate victim of seasickness.

Captain Kantz dwelt much on the beauties of

a place he called Clearwater Harbor. He said that doubtless I could find some one there from whom I could rent a house. He spoke especially of a certain Dr. Powledge, who seemed, from the captain's account, to be a person of importance. All this occurred during our first day's sailing, and as there did not seem to be anything to attract particular attention in the region we passed, I determined to go at least another day's journey toward the South. That night we anchored near some little islands, and were underway again early next morning.

The first day's sailing had been in the open sea; now a chain of islands, one after another, resembling those on the Jersey coast, separated the Gulf from spacious and sheltered bays, through which we passed. These bays are entered by passes and inlets similar in character to the inlets of the Atlantic coast,—Barnegat, Egg Harbor, and the like,—but of course smaller. One of these sheets of water is known as Clearwater Harbor, and on the afternoon of the second day we came in sight of a dock extending some three hundred and fifty feet out into the bay, which Captain Kenty informed me was the wharf of Deacon Powledge's warehouse; for by this time he was calling the proprietor indifferently "Deacon" or "Doctor" Powledge, as occasion seemed to suit. Anchoring a little way out,

the captain, Mrs. Scott, and I went ashore in a small boat.

I wish it were in my power adequately to describe the primitive and remote conditions of this whole country. From the hour we left Gigger's Island until we reached Clearwater we saw no one: no man, no boat, no house, and yet we were sailing all the time within a couple of miles of the shore, passing what appeared to be an unbroken, primeval forest, an uninhabited wilderness.

On landing, after some inquiry at the house, I found that the deacon was in his orange-grove, where I proceeded to join him, leaving Mrs. Scott to be entertained by Mrs. Powledge. Dr. Powledge was a man at that time about seventy years old. He was tall and slender, of nervous build, but slow and deliberate in motion and utterance. He greeted me with, "How d'ye do, suh? Air ye healthy?" I explained to him as we walked back what I wanted; to all of which he listened with apparent interest, but without any comment. On entering the house, I presented him to Mrs. Scott, and again, "How d'ye do, marm? Air ye healthy?" was his greeting. I have forgotten about his inquiries as to the state of the world in general; they were not many, for he was a reticent man; and after some ten or fifteen minutes chat I again asked him whether he thought it would be possible to arrange

to rent me a small house which stood near the water, as well as a room in his warehouse for a laboratory. He responded to this by asking how much rent I had paid at Gigger's. Then he spoke of a mythical owner whom he would have to see. When my patience was about to give out, he began a discourse much as follows. His utterance was abrupt and direct, but slow and nasal, the words pronounced in a drawling fashion and the vowels flattened.

"Scaat, I think ye a good man. I'm a man o' peace; an' I'm the honestest man in the world. I'm a doctor of medicine and doctor of divinity, and I'm a man o' peace. I think ye a good man. Scaat, but I cain't tell. You all might be a drinkin', gamblin', carousin', dancin' man, and I tell ye, I'm a man o' peace. I'm a man o' peace, but if ye trod on m' toes, I'd fight like a dawg." All of which seemed to indicate that further negotiations as to residence in that immediate vicinity were out of the question. I therefore announced to him that I would return to my boat, thanked him for his consideration, told him I was interested in his place, and thought I could have achieved results that would have been good for both of us, bade him good-by, and proceeded out through the warehouse to the long wharf, and at the end of it embarked and pushed off to the schooner. I had intimated to the doctor

just before parting, that I had heard of a certain Parson Kilgore who resided some miles below, and asked whether he knew if I could get quarters there. He thought I probably could, but I saw that my reference to Parson Kilgore somewhat nettled the old gentleman. As we pushed off from the dock to go out to the schooner, it was almost dark, not more than half an hour or so of daylight remaining. We had perhaps proceeded some twenty feet, when there was a hail from the door of the warehouse, and the high, strident, nasal tones of the patriarch sounded across the water, shouting, "S-a-ay, Scaat, you-all kin hev th' house." So we returned and concluded the bargain.

The next morning we brought ashore all our various belongings. Again we set up our camp, this time in the shade of a banana patch, fronting an orange-grove of many acres, in which grew the choice varieties that are produced by the soil of a shell hammock. Here sang by day and night the tireless mocking-bird, and here the great Carolina wren poured forth a flood of melody.

Over the walls of the little house, climbing on the stems of the bananas, tangled in every bush and hiding every sharp angle, grew an irrepressible vine. Its deep green arrow-shaped leaves formed an effective shade by day, and in the dusk became a background for a blossom so pure in its color

and subtle in its fragrance as to seem a marvel. Well is it named the moon-flower, adding to the glamour of the silvery night. Then it was unknown to gardeners. We brought back seeds to plant in our northern home, and here its queenly beauty reminded us, for successive seasons, of southern shores.

Fig bushes screened the grove on the west from the winds of the Gulf, and afforded us an abundance of their delicious fruit. The sour or Seville orange was indigenous, and in such quantities that a large store of marmalade was made in our tiny kitchen, and proved an acceptable gift to northern friends. We were less isolated than at Halcyon Island. Cracker and conch families dwelt about in the "piney woods," and occasionally a cracker lady came to call on Mrs. Scott. The turkey red that covered the rough walls of our sitting room, the few Japanese prints and scrolls, were of vast interest; and it was pathetic to watch the women as they touched admiringly our few ornaments. The dust-pan was a curiosity. One dear old lady who came frequently to spend an afternoon never tired of describing her first and only journey by steamer,—from Savannah to Florida. On Christmas Day a dinner of ceremony was given. "An', Miss Scott, they took off one table-cloth, an' thar was another table-cloth, an' they took off that table-

cloth, an' thar was another table-cloth." Then, after enumerating all the viands, none of which she had forgotten, she went on to say, impressively, drawling out the words, "An' then, Miss Scott, we had silly-bubs an' silly-bubs." To the poor soul whose diet from year's end to year's end was hog and hominy, spread on a bare deal table, with a "mess of greens" now and again, one can imagine the impression made by the table-cloths and the syllabubs.

Old Uncle Tommy H—— was distinguished in that he owned one book besides the Bible. It was an old copy of Thomas à Kempis, which he read diligently. To be sure he was much disturbed one day when Mrs. Scott picked up the volume, astonished to find him so absorbed. "Please don't lose my place, mum," he plaintively said. Uncle Tommy's visits were long ones, and we were sometimes too busy to devote ourselves to his entertainment, to reply to his innumerable questions. Mr. Devereux went out to meet and head him off early one morning, when we were all particularly busy. Being a bit of a wag, he said, "Excuse us, now, Uncle Tommy; we are having family devotions." At this Uncle Tommy hesitated, and then the interrogatory came, "Wall, Mr. Deboro, who op-pe-rates?"

So tame were the wild turkeys that they fed in the woods near by, and once, in my absence, Mrs.

Scott saw several roosting in a tree that overhung the house. Until they flew she thought a neighbor's turkeys had strayed, then suddenly remembering that none were domesticated here, she stepped quickly inside for a gun,—but the birds were out of sight. She has never ceased to mourn the lost chance.

The country here was very different from that we had left. Instead of a low-lying shore bounded by great sedge-grass swamps, the banks of the mainland were abrupt, and rose frequently to some thirty or forty feet above the level of the adjacent waters. The pine woods reached almost to the shore, except where they were interrupted by what were known as "shell hammocks,"—small areas covered with palmettos and growths of deciduous trees. There were no groups of tiny islands such as characterized the Withlacoochee, but a vast bay stretched up and down the coast, shut out from the Gulf by a succession of long, narrow, low-lying sand islands, whose outside shores were the real sea beaches of this part of Florida. The water in these bays was rarely more than ten feet in depth, and generally it was much shoaler. In fact, the whole sea floor of this entire region is very flat, the four-fathom line in the Gulf as marked on the coast charts being generally out of sight of land.

The water of the bay, except during periods of

severe storm, was clear, and abounded in all kinds of fish, as well as in oysters, other kinds of shell-fish, and marine crustacea. This environment produced, of course, a somewhat specialized bird fauna, different from that we had just left. The region was chiefly remarkable for the abundance of such birds as herons, represented by a number of species and a multitude of individuals. Great throngs of cormorants and pelicans were also present, while the shore-birds congregated chiefly just at the mouths of the passes. This was also true of gulls and terns.

A bird of particular interest was the reddish egret. It was common, but only to be found in the vicinity of salt water. This habit alone would distinguish it from Ward's, the little blue, the Louisiana heron, and the two white egrets. All these later birds frequented both salt and fresh water with impartiality. The double color phase of the reddish egret is also noteworthy. While the dark phase prevailed, pure white individuals were not rare, and several adult pied birds were obtained. Both phases of color were represented in the breeding colonies, and Mr. Devereux obtained young from the same nest, two of which were immaculately white, the other fledgling a typical dark bird. This egret in white plumage, which does not correlate with age, sex, or season, has been described and was for a

long time known as Peale's egret. Besides the ubiquitous brown pelican, large flocks of white pelicans were frequently seen. The roseate spoonbill was met with almost daily. Once from near at hand I saw a flock alighting on a mud flat exposed by the tide; the birds must have covered, as they sat close together, upward of an acre of land. The rays of the declining sun shining on their beautiful rose-colored feathers reflected a picture of wonderful color, while the spoonbills in their methods of feeding and action were of more than ordinary interest. One has but to see the curious spoon-shaped bill of this ibis to realize that the bird is wholly unlike any of its congeners.

Now for the first time I observed the frigate pelican, the man-o'-war bird, and was able to form impressions of my own with regard to this prince of flyers. The man-o'-war is in general color black, and I can liken him to nothing better in form than a barn-swallow; the same long, pointed wings, forked tail, short neck, and slim body characterize both. Imagine, if you please, a black barn-swallow stretching six feet from the tip of one wing to the tip of the other, with a forked tail in proportion, and you will have a very vivid image of the appearance of the man-o'-war bird in flight. Here the parallel ends. For while the barn-swallows flit, glide, and skim over pond and

meadow, and seem among the most accomplished and graceful of flyers, this huge bird performs all these evolutions, and in addition possesses powers of soaring that are rivalled only by the albatross. While floating high overhead, with long, forked tail and slim, expanded wings silhouetted against the sky, sometimes almost motionless and again drifting with the varying air currents, the bird has often appeared to me like a human being endowed with miraculous power. At close range, and when in active flight, besides the swallow-like evolutions suggested, other remarkable manœuvres are frequent. I have often seen the man-o'-war pause for an instant in mid-air and scratch the side of his face or top of his head with his foot; the performance, too, was heightened by the extreme deliberation of the accompanying motion. Not only do these birds fly well and soar at great heights, but they possess the power of prolonged and sustained travel. Often they are encountered far at sea, and stories of their accompanying vessels for extended distances are current.

In habits the birds are parasitic; that is, their food is usually obtained after it has been caught by some other kind of bird; at Clearwater and to the south, the brown pelican is the constant and almost the sole victim.

The bald eagles were even more abundant at Clearwater than they had been at Gigger's. There

were eight nests within half a mile of the wharf, and two were close at hand.

The beaches of these interior bays are pebbly at points, sandy at others, and again muddy. Here Wilson's plover, a resident bird, found congenial feeding and nesting ground. This small plover is somewhat larger than the ring-necked plover, and of heavier and stouter build, with a longer and stronger bill. The sexes are readily distinguished by the difference in color of the band across the breast. The willet was also one of the commonest of the shore-birds, and bred in great quantities at points not far distant, notably in Old Tampa Bay. In this vicinity I saw for the first time the great salt-water rookeries of herons, pelicans, and cormorants that once were common along the entire Gulf Coast of Florida, but which the persistent persecution of plume hunters and so-called sportsmen has almost eliminated. Some of these breeding places were of vast extent; one at the mouth of Tampa Bay, known as the "Maximo Rookery," occupied an island of over five hundred acres. This island was thickly covered by a growth of black mangrove trees which stood so close that their outstretched limbs were interwoven, and nearly every tree at certain seasons of the year afforded a site for from five to a dozen nests of herons.

The birds that bred here were Ward's heron,

the little blue heron, the Louisiana heron, the reddish egret, the great white egret, and the snowy egret. Conceive, if possible, this vast assembly of harmless, gentle, conspicuous, and beautiful birds during the breeding season. Recall the description I have given of the breeding site of similar birds on the shore of Panasofkee Lake. Magnify such a description tenfold, and the result is much less than the reality. It was a colony of birds that the eye could not take in at a single sweep. In the landscape the feathered population was the predominant feature. All this could be seen but little more than twenty years ago; all of it was destroyed during the next six or seven years.

We guard with care and highly prize our great libraries and art collections. We go to the extent of keeping the rare books, pictures, and objects of art away from the touch of the general public. Here, out of doors, was one of the treasures of nature; a thing of beauty and priceless value; a never ceasing panorama of action suggesting emotions of a profound nature—all this was wantonly destroyed. I trust that the time will come when civilization will appreciate as fully the treasures of nature as they do the treasures of art. There is only one Venus de Milo; there was but a single great bird island, at the mouth of Tampa Bay; it had no

duplicate. The statue has been carefully guarded; valued as a standard of beauty, it is viewed by students and masters from every part of the world. The other, with all its complicated educational elements of which beauty was not the least, has been destroyed, cannot be restored, and is only known by tradition.

At Clearwater much of our exploration was accomplished by water, and here to this end the "Bandersnatch" was utilized to the wonder of the natives. Our aquatic pursuits were a source of concern to our landlord, and he constantly cautioned me that we were taking our lives in our hands. One day when about to embark, to allay his anxiety I assured him that I was a fairly good swimmer, and, moreover, that in most places, even if we had to desert the boat, it would be possible to walk ashore. But he shook his head and would not be convinced, and finally confided to me that he had always preferred to travel by land. He had come from Georgia directly after the war, to establish himself in Florida, and had moved all such property as he possessed by teams and wagons. He informed me he had never crossed to the outside islands; that he considered it a very dangerous undertaking, and wound up by saying to me:—

"Waal, Scaat, you-all and Mr. Debil may be web-footed, but I'm a high lan' chickin."

Here I was much more fortunate than at Withlacoochee in obtaining sympathy and assistance from the natives of the region. The conchs particularly proved efficient as guides and hunters. Two members of one family were in my constant employ, and were known respectively as the "high conch with the red beard," and the "little low chunky conch." The name "conch" is given to natives of the Bahama Islands or the Florida Keys. They are so called because of their alleged use of the conch as food.

Dr. Powledge not only ministered to the spiritual and temporal needs of his neighbors in his capacity as deacon and physician, but had also the only store of the region. Everything could be purchased, from gunpowder to furniture, from medicine to musical instruments, from clothes to Bibles.

In my traffic with the hunters who brought me various specimens of birds for my collection, the prices paid were insignificant, fifteen cents being perhaps the maximum. In the course of a few weeks I may have spent a sum in small coin aggregating some twenty dollars. This all went back into the till of the good deacon, who, in his turn, would cash a check for me, or change a bill into the dimes and nickels which furnished the medium of barter, and the "endless chain" was maintained throughout my visit. On my de-

parture the doctor again informed me, as he had frequently done:—

"Scaat, I'm the honestest man in the world, but I reckon you-all air pretty honest, too; and you-all air the richest man that ever came here. You-all brought more ready money and cirkilated it here than any one that ever came."

When I say that my total expenditure in cash at Clearwater was a sum less than two hundred dollars, the reader can get an idea of the financial conditions of this part of Florida at that time. Nearly everything in the way of trade was done by barter, and ready money had a great purchasing value. We were supplied by the natives with oranges, oysters, and other kinds of provisions for the household. The finest oranges were worth from fifty to seventy-five cents per hundred, and the best oysters were brought to the dock and planted in the water, where we could readily get them, for sixty cents a barrel.

The doctor's ideas of the outside world were often peculiar. For instance, I remember one day talking to him of the national debt, which grew out of a discussion of some problems resulting from the Civil War. This debt was then being paid off at the rate of from twelve to fifteen million dollars per month, and I mentioned it as an indication of the prosperity of the country. His notion was different. He said:—

"Why, Scaat, you-all don't know nuthin' 'bout it. All them ther fellers in Washington dew is to run a printin' press, an' they kin jest as well print a hundred million as twenty million dollars a month. I don't see why they don't pay off the whole debt in one printin'; coz they could easy enuf."

We remained in Clearwater until some time late in March, and left the place and the friends we had made with regret. Mr. Devereux, my assistant, stayed in the interests of the museum some two months longer. The result of our mutual work during that winter is set forth in detail in a paper cited in the bibliography.

CHAPTER VIII

THE SEA AND THE DESERT

THE next year I was constantly in Princeton, confined closely to the work of extending the growth of the museum. This had now assumed such proportion that it was essential to have some one working continually at the collections, keeping them in repair and adding to the exhibits material that had been accumulated from the several expeditions.

In the spring of 1881, having all the museum matters well in hand, I made an expedition to Cobb's Island on the coast of Virginia. Just north of the capes of the Chesapeake, the eastern shore of Virginia is protected by low, outlying sand islands not unlike those found at various points on the coast of New Jersey. Some of these, notably Hog Island, are inhabited, and Cobb's Island at this time afforded residence for a family of settlers by the name of Cobb, who had lived there many years, maintaining a house of entertainment for sportsmen. As a sportsmen's resort it was noted. The adjacent waters and marshes teemed with bird life, the fishing was

excellent, and the many waterways afforded fine opportunity for boating.

The bay-birds migrating along the coast in the spring and fall found at Cobb's Island plentiful supplies of food. This and other local conditions attracted them in vast numbers. The usual group associated with the sea beaches and marshes of the Atlantic coast were represented, and there was little difference in kind as compared with Barnegat. The numbers of the greater and lesser yellow-legs, the Hudsonian curlew, the dowitcher, the jacksnipe or creeker, the robin snipe, the willet, the black-bellied and golden plovers, not to mention innumerable representatives of least and semi-palmated sandpipers, were striking. The marshes sheltered quantities of clapper-rail, while the beaches on the surf side were patrolled by many piping, ring-necked, and Wilson's plovers, as well as hosts of sanderlings and dunlins. Wilson's plover, unlike the others, bred here in the rough shingle, not far above high-water mark, and willets were equally plenty, breeding in the marshes.

It was the great number of different kinds of gulls and terns that had attracted me to this point. Here vast colonies of them found breeding ground. It is difficult to say which kind were more numerous; there were myriads of all. The laughing gull was the only true gull breeding, but when I first arrived at Cobb's Island, Bonaparte

gulls, ring-billed and herring gulls were passing to their more northern home. The outer beaches were the resort, not only of many terns, but there too came oyster-catchers, which bred in the sand dunes just back of the beach, and whose nests were readily discovered by the regular trail the birds made in their frequent journeys to the ocean's edge.

Among the terns breeding were the gull-billed tern, Foster's tern, the common tern, the least tern, the royal tern, and the black skimmer. Now and then one met with representatives of the sandwich tern, and at least a dozen pair of Caspian terns nested each season. The breeding colonies of the several sorts were clearly defined, the different kinds not associating together to any extent.

My purpose in coming here was not only to make adequate collections of the eggs and adult birds, but more especially to procure large series of the fledglings in various stages of their early life. In this work, thanks to a good assistant, I was eminently successful.

My dog Grouse, who was with me, aided largely, finding numbers of nests and young birds that would otherwise have been overlooked. Posted just outside of some piece of sedge-grass, I had only to command him to go in and fetch out young birds. He did this kind of work with-

out reluctance or demur, but on the whole with a deprecatory air, appearing ashamed of being used for the purpose. Disappearing in the long grass, in a few moments he was back with a young gull, a clapper-rail, or some other downy chick. When I took the bird from him, it was not only unharmed and unruffled, but the delicate plumage was seldom even moistened by contact with the dog's mouth. If I did not care for a specimen, I would return it to him, tell him to take it back, leave it where he found it, and bring me another. Off he would go, and presently return with a different bird. I have seen dogs that would fetch, but I have seen but one or two dogs that would take things away and return them to the spot whence they had been brought. In the house, Grouse would not only bring me my slippers, but would take away my shoes and put them as carefully in the closet as I could myself. He knew just where they belonged, and in what position they should stand. I fancy he was as solicitous in returning the unharmed fledglings to the place where he found them.

Cobb's Island has been largely decreased in area by some of the more violent storms of the last ten or fifteen years, and is now comparatively small, whereas formerly it was some three miles long. On the bay side vast marshes extended over hundreds of acres. As a breeding ground

at present it affords little space, but such areas as remain seem to be quite sufficient for the birds that resort there. Previous to the decrease in the size of the island, the persistent efforts of egg hunters and gunners for millinery purposes had achieved the usual result; what was once one of the notable breeding places of gulls and terns has long since been wholly abandoned by the larger part of them.

Six weeks sufficed to start the work that had been undertaken here, and intrusting its completion to an assistant, the rest of the summer was passed at Nantucket.

As a result of the work at Cobb's Island, there are in the collections of the Princeton University Museum a series of all the kinds of terns and birds that I have mentioned breeding at this point, except the sandwich tern, which was only a casual bird. Practically every stage of growth is represented, from the chick just hatched to the adult. The common tern, Foster's tern, the royal tern, the black skimmer, the least tern, the willet, the clapper-rail, and the gull-billed tern are included in the collections in this way.

While at Nantucket, a week was spent in studying the petrels that are present off the coast of Massachusetts during the month of August. To observe these birds and procure specimens of each kind it was essential to visit some of the "banks"

where cod-fishing was carried on. It may be of interest to know something more in detail of the conditions that obtain in such localities. From the town of Chatham on Cape Cod, in favorable weather all through the warmer months of the year, a very considerable number of fishermen go regularly to the "banks" to catch cod, both for use as fresh fish, and when plentiful to manufacture into one of the staples associated with the New England coast, salt codfish.

The fishing is carried on in large cat-rigged boats or sloops, and usually the fishermen do not remain away over night, for it is but a couple of hours run to "the banks" under favorable conditions. With a fisherman I left Chatham very early one morning, and by daylight we were far out at sea. A gun and ammunition were part of my equipment, and as occasional birds were seen in the distance, I thought it worth while to begin my preparations. I saw an amused look pass over the captain's face as he said to me, "Better wait till we get where the birds are; it will be easier to get 'em." After two hours' sail — we were now out of sight of land — he announced that we had arrived at the fishing banks, and that he would make a try. This seemed to be entirely foreign to the work I had come out to do, but I did not interfere. Without anchoring the boat, simply heaving to, he baited a couple of codfish

lines and lowering them soon had two large fish struggling in the bottom of the boat. As he had now reached a desirable spot he anchored, kept on fishing for a few minutes, and when some eight or ten codfish were in the boat he said he would show me the birds that frequented the fishing "banks." He then took the livers of several of the codfish and cut them into very minute pieces; grinding these into pulp, this "chum" was cast overboard to float on the water. A long, oily streak on the surface now indicated the run of the tide, and this streak soon reached farther than the eye could follow. When we anchored I had seen one or two birds at a very considerable distance, and now, following down this oily streak or lane, they began to arrive in the vicinity of the boat, allured by the bits of liver. Shortly, birds were about us in countless numbers. They consisted almost entirely of the stormy petrel, the greater shearwater and the sooty shearwater, with an occasional parasitic gull. Before collecting any specimens, it seemed worth while to examine the birds with care, for I feared that with the report of the gun they would be frightened away. So I waited for a time. The captain now took a piece of string, some seven or eight feet long, fastened a large piece of codfish liver to it, which he tied on securely, and allowed it to float out at the stern of the boat. I had thought the

birds were quite fearless from the first, but was not prepared to see them come to such close quarters. As soon as they detected the large piece of liver tied to the string, they thronged about it like flies about a lump of sugar. Gradually the cord was shortened, drawing the bait toward the boat, until it was not more than three or four feet from the gunwale. From the cabin the skipper brought an ancient crab-net with a long handle, and presently he was catching the three kinds of petrels, much as one catches butterflies, emptying his net as he caught each bird into the cock-pit of the boat. Here they were absolutely helpless, as from such a flat surface it was quite impossible for this kind of bird to rise on the wing, and they walked about much after the fashion of chickens, and with about as much commotion as fowls make when intruded upon. Shortly all appeared to be affected by the motion of the boat and began to disgorge what they had eaten, and the cock-pit was now a scene of filth which can be better imagined than described.

Of course it was not necessary to use a gun. We caught the birds, and they were in much better shape than we could have obtained them by the other method. We selected only such as seemed of particular value, allowing the rest to go overboard, where, on reaching the top of a wave, they immediately took flight.

Collecting of this kind seemed much like catching butterflies, and the little stormy petrels hovering over the pieces of liver bore out the illusion by their motions as they poised and fluttered about the bait. At a single sweep of the net the captain took in nine of these little birds, which will give an idea of their abundance.

The two larger petrels, and the greater and sooty shearwaters, are birds that measure about forty inches across the wings and are larger than a common crow. Their flight is very swift and their wings beat fast; but, nevertheless, as one would pause in passing to attempt to grab the lure, the captain would have him in his crab-net, and then the bird would be on deck, fighting and biting and trying to get away, but unable to take wing from the flat surface. There were present besides a number of parasitic gulls, which were harassing the several kinds of petrels whenever an opportunity occurred.

There are some ten or more representatives of the family of petrels common in the waters of the North Atlantic; and several of these breed on islands such as Bird Rock of the Magdalen group, as well as on St. Kilda, the Shetlands, and other islands in that ocean. But it is not until the equator is passed and one is well south that the variety and abundance of petrels become a feature of a sea journey. The most impressive

among these birds is the great albatross, famed in song and story, but other members are almost as large in size, the giant fulmar and the wandering albatross being among them. Then comes a group which is fairly represented by such birds as the greater and sooty shearwaters. Intermediate in size between these birds and the little black petrels with the white spots on their rumps, which, without regard to specific difference, sailors term "Mother Carey's chickens," comes the Cape pigeon. A number of other congeners vary slightly in size and form. Finally, there are many kinds of the small birds referred to as "Mother Carey's chickens," and when the antarctic ice is reached a little snow-white petrel is in evidence.

The petrels are the wanderers of the sea. No point is too distant from land for their journeys. They are equally at home in calm and storm, and seem only to resort to unfrequented islands or land for the purpose of breeding. At such seasons they assemble at favorite localities, often in great colonies, where some nest upon the surface, but more prefer to excavate a burrow in the ground, or to retire into some cranny to lay their eggs.

On the whole, petrels may be characterized as par excellence the fliers among birds. The eagle and the condor may be noticed frequently at rest, but these Arabs of the sea seem ever on the wing. The ocean waste is their home.

Presenting an antithesis to these birds is another group characteristic of the southern seas, the penguins, birds without the power of flight. Whoever has been so fortunate as to see them, not on shore, but in their own element, forms at once an entirely new conception of swimming. The penguins do not swim; they fly through the water. For this purpose the feet are not used, and no paddling, or swimming in duck fashion takes place. With their feet straight behind them and close together, used only as a rudder, the penguins perform every evolution (assisted by their transformed wings, which resemble closely the flippers of the seal) that the swallow performs over a grass meadow or pond,

The motion is as rapid, the evolutions are as precise; the quick turning of the birds flying through the water in pursuit of small fish can only be compared to the characteristic motion of swallows in pursuit of minute insect prey.

For those who are unable to make the long journey necessary to see penguins in their native haunts, most zoological gardens have glass tanks, often of great size, in which at stated times tiny fish are liberated. One or two penguins are then allowed to enter the water. There, as in an aquarium, one may see everything that has been described. Not the least remarkable fact is that penguins, unlike diving birds in general, do not

rise to the surface when they have seized their prey; it is eaten where it is caught, below the surface of the water, during the continued flight of the bird through that element. The shores of Patagonia, Tierra del Fuego, the islands of the southern oceans, and parts of the coast of Australia are the homes of the penguin.

Late in the succeeding winter I made application to the college authorities for a leave of absence to visit Arizona. My reasons for going to this point were twofold. One was personal, the other was a wish to see a country whose bird life presented combinations of desert and mountain fauna. It was the desert particularly that attracted me. I travelled west, passing through southern Kansas and southeastern Colorado, southward through the mountains of New Mexico, entering the desert shortly after leaving Deming.

The country presented a novel aspect, but the picture of a desert that my imagination had painted was not at all like this reality. Aridity was the salient and prevailing character, but the long, unbroken stretches of sand, the waste, which I had imagined as having much the aspect of a desolate sea, was not here.

Instead, a vast, flat plain, whose horizon was bounded by abrupt mountain chains, extended on every side. Distributed over the surface were sparse growths of isolated trees, miniature

locusts in their general character. Among these trees many varieties of cacti abounded, from the round, globular ones known as "nigger heads," to the branching, brittle, and thorny chollas, such growths culminating with the vast and grotesque shapes of the giant cactus, sometimes a monolith, again a cross, and again a huge candelabra, with every conceivable variation between the three types. The almost naked ground was scantily decked with scattered bunches of dried grass, cured in the pure and heated atmosphere as it stood, a mummied effigy. Everything, the hills on the horizon, the plain itself, and the ensemble of plant life, was dull gray brown in tone, with suggestions of sombre yellow here and there to lighten it. The atmosphere was singularly clear and transparent, the sky cold blue, and cloudless.

I had not pictured the waste of my imagination with inhabitants; birds and beasts were no part of the prospect. Again I was at fault. Nowhere have I seen so varied and teeming an aggregate of small birds, reptiles, and insects as was presented at every turn. This was no barren, desolate, or forbidding region.

A day's travel still disclosed at dusk the desert stretching away westward, when I left the railway at an obscure station. There was no town; the building that served the purpose of accommodating passengers and freight, and one or two rude

shanties clustered about, were the only ones in sight. The journey from here was made by wagon, for my destination was a point some seventy miles away, known as Riverside, on the Gila River. The first stage of this ride ended at a town called Florence, the county seat of Pinal County, situated on the same river, and some thirty miles from the railway.

After his memorable journey across the southern part of what is now the United States, Cabeça de Vaca, when he ultimately arrived in the city of Mexico, described to the astonished Spaniards, as the consummation of all the wonders of his prolonged wanderings, El Dorado, a mighty city, the roofs and walls of whose houses, seen by him only from a great distance, he believed to be of pure gold. Even at the point from which he viewed them, not being allowed to go nearer, he was impressed, not only with the magnificence of the material, but with the proportions of the great structures. So vivid was the picture he painted and so enticing to the cupidity of the adventurous followers of Cortez that, as is well known, while Alvar Nuñez would not consent to lead them to the place where he had seen this miracle, yet his only comrade in the long journey, save the natives who guided him, Esteban el Negro, undertook to pilot a band of these indomitable discoverers and rapacious marauders to the point

in question. The story is too well known to be further dwelt on here. The adventurers started without the "White God." They were never heard of afterward, and the fable of El Dorado has become a tradition.

Leaving the station of Casa Grande, after a drive of six or seven miles, there loomed out of the distance on the flat plain, which here seemed more fully to realize my preconceived notions of a desert, a mammoth structure. Standing all alone as it does, the ruins of this colossal house built by unknown hands look out upon an expanse of almost desert country as far as the eye can reach, the ultimate view being one limited by the ever present horizon of mountains. As we came close it was seen to be an oblong edifice, perhaps a hundred feet wide and some four hundred feet long. The main walls, at places eight and even ten feet thick, indicated a building which had once been at least three stories in height. This could plainly be seen by the empty mortices, in which the beams that had once supported the several floors formerly rested. The roof of this vast pile was gone. Around it, at various points, huge mounds of gravel, clay, and sand marked where the hand of time had disintegrated and almost levelled other structures of equally imposing proportions. What had once been a canal was marked only by a depression,

leading far out into the desert toward the river some fifteen miles away. One may picture Cabeça de Vaca looking down from some distant hill at eventide on the huge habitations, standing in a cultivated plain, irrigated by water brought in the great ditch from the distant river. As the rays of the declining sun struck on the flat roofs and walls of the city, painting them all with gold, it needed no sublime faith to credit the marvellous tales of his guides,—El Dorado, the land of gold, stretched away at his feet.

The day's journey terminated at Florence, the first Mexican, or semi-Mexican town I had seen. A straggling collection of one-story adobe houses, some of them residences, others stores, and again, on the outskirts, apparently cattle or agricultural ranches, the whole brown and dusty, and pervaded with that peculiar, indescribable, subtle, sweet aroma of alkali.

An irrigation system, depending on the river which ran hard by, afforded not only means for growing many shade trees, but in places attempts were made to secure a growth of grass. Along the river itself rose cottonwoods and other trees of considerable dimensions, with an under-growth of bushes of various kinds, not unlike what one sees in any similar location in the East.

The birds, however, were all different. Every

group of bushy cactus on the way over the desert had one or more pairs of cactus-wrens; generally some Palmer's thrashers were also to be seen in these localities, and Bendire's thrasher was not infrequent. Occasionally meadow-larks of the western type were noticed; but the quail of two kinds, the scaled and Gambel's, were the pre-eminent bird inhabitants. They were everywhere; in the road, and scrambling away through the dried grass, sometimes when approached and surprised flying to a bush, but generally running in small troops on the ground.

Wherever the giant cactus reared its columns, several kinds of woodpeckers abounded; the red-shafted flicker, the Texan and Gila woodpeckers were most conspicuous. In many places these plants bore evidence of being the nesting sites of the birds. The circular borings which shone out as round, black spots on their outstretched arms, marked the entrance to many homes. Again, the nest of some large hawk rested in the protecting arms of these giants. Swainson's hawk and the western form of the red-tailed, were the proprietors. The adaptability to environment, exemplified by the nesting habits of birds, is here well shown. As every one knows, in the eastern part of America the red-tailed hawks generally build their nest in the loftiest trees of dense forests; they are always situated at very consider-

able heights, and are difficult of access. In the desert I have frequently looked from the ground into the nest of the red-tailed hawk set low in some low mesquite, or in the branching arms of a giant cactus.

A number of species of doves were also conspicuous both on the drive and in the streets of Florence, noticeable among which was the white-winged pigeon. These birds were generally gregarious, and frequented clumps of giant cactus in the vicinity of water, though also met with far out on the desert. Now and then that fleet-footed bird, the road-runner, "chaparral-cock," or ground cuckoo passed across the road in front of the wagon, and quickly disappeared with his rapid, gliding gait into the nearest cover. I did not see one fly. Generally they would stand for a moment to look, with erected crest, at the coming vehicle, and then, with outstretched neck and long tail all in a line with the back, the whole reminding one of a race-horse at his extended pace, these birds would bear out the common name given them.

In the mesquite growths, pairs of yellow-headed titmice were always present, and bush-tits in companies might be seen in similar locations. About growths of palo verde, that well-named tree with microscopic leaves, which was then adorned with its golden bloom, many humming-birds congre-

gated, as also wherever the agave or century plant was in bloom.

Late the next afternoon we started for the thirty mile drive to Riverside in the valley of the Gila. The route was through the foot-hills of the mountains which rose on either side of the river, and we were constantly passing over hills of considerable elevation. To avoid the heat we had started late in the day, and most of the ensuing drive was by moonlight, so that impressions as to the fauna and flora by the way were indefinite. Just at dusk a little whippoorwill alighted in the bare dust of the roadway, and now and then a coyote trotted leisurely away ahead of us, or another would view the passing vehicle from some neighboring elevation, with every indication of interest. Both jack-rabbits and their smaller allies gambolled by the roadside, and several times the horses shied violently as the shrill cicada-like warning of a rattlesnake broke the pervading stillness.

The journey was necessarily slow, as much of the road followed the beds of dried-up streams and was extremely sandy. These dry waterways were at that time the most feasible lines of travel, and were utilized throughout the mountains, wherever the pioneer had penetrated their fastnesses. Passage through this sand of course was accomplished silently, and hence every sound

was audible. The call of the little whippoorwill that we had seen was composed of two notes, and was much more deliberate than the song associated with the whippoorwill of the East. Uttered some five or six times in succession, it sounded like "poor will, poor will, poor will, poor will, poor will." At about eleven o'clock we arrived at our destination, Riverside; as far as I could see in the moonlight, this city consisted of a single house, and morning confirmed this conclusion.

Daylight disclosed a narrow and winding valley, through which flowed the Gila, a rushing mountain torrent about one hundred and fifty feet wide, and fordable only at a few points. At ordinary times the water is clear and limpid, though slightly alkaline in quality, but in flood the stream is turbid, and the strength of the current with the additional depth of water makes fording impossible. The valley is so narrow that the bottom land in this neighborhood is scarcely sufficient for cultivation. On the northern side of the stream rise abruptly the foot-hills of the Pinal Mountains, a rugged range whose highest peaks attain an approximate altitude of ten thousand feet. On the south side of the river the bottom land extends back for perhaps a quarter of a mile, and then a series of plateaus, the ascents to which are steep, shut in this side of the valley. These plateaus or mesas are char-

acteristic of the southwest. They are broken by arroyos, which are the beds of streams that have cut deep into the face of the country, often forming cañons, and rarely containing water save at time of flood. The dry beds of the arroyos are frequently the driveways from one point to another. The vegetation is similar to that in the vicinity of Florence; large sycamores and cottonwoods are common along the river banks, while a scattered growth of mesquite and palo verde, interspersed with cat-claw thickets and growths of ocotilla and the different kinds of cacti, stretch back into the hills on either side. Except directly on the edges of the river there is no verdure save during the rainy season, to which I shall refer later, the whole country presenting the parched, dry, brown character that distinguishes the desert in general.

Just back from the stream on the south bank, a little way from the ford which crosses it, stood at that time a single adobe house with a few out-buildings; this with one cabin composed the town of Riverside. The view of the river, the mountains, and the plateaus directly across was extremely picturesque, and contrasted strongly with the squalor and insignificance of the settlement. What little traffic occurs in the vicinity of a ranch of this kind very soon destroys the bunches of grass which at other points relieve

the arid waste. On either hand, almost as far as one could look up and down the valley, the ground was as absolutely bare as if newly tilled. Add to this its parched character, which allowed the slightest travel to grind the surface into dust, and the picture is complete.

At the time this ranch at Riverside served as a station for the stage route that ran from the railway to the city of Globe, a copper camp of considerable importance, high in the Pinals. As I proposed to make this my headquarters for some two months, I looked about for quarters. Finally I secured the solitary cabin, which consisted of a single room, some twelve feet square. It was built of adobe, and had the ordinary mud floor and roof. On the side away from the river I soon had erected a shade forming a sort of piazza or outside room. Here in most weathers I was able to prepare such ornithological material as was collected.

Small birds were present in great numbers and variety. The Gila woodpecker could be heard calling everywhere, much like its red-bellied ally in Missouri and Kansas. Mocking-birds and two thrashers, Palmer's and crissal, sang constantly. Along the river, two warblers, one of them breeding commonly, at once arrested my attention. These were Lucy's warbler and Virginia's warbler, both characteristic of this region. The

vermillion flycatcher, the male of which is a striking bird, was also numerous, while the Arkansas flycatcher which takes the place of our king-bird of the East, nested both along the river and back in the foot-hills. The common phœbe of the East, associated in every mind with rural bridges, barns, and houses, was represented by the black phœbe; and another, Say's phœbe, was found here as a migrant. The great crested flycatcher also found a prototype in the crested flycatcher of Arizona, which not only resembled it in habits, but was like it in appearance. This was eminently a region of flycatchers, for I have not enumerated all the different kinds. Twelve others occurred here either as breeding or migrant birds. The exuberance of insect life largely accounted for the predominance of this family. A word further regarding one mentioned, the vermillion flycatcher, to distinguish him. This is a little bird; in size about like the wood-pewee of the East, with a chocolate brown back, tail, and wings. The head is surmounted by a fiery scarlet crest, reaching all over the occiput and down to the eyes, and the entire under parts are of this same vivid color. Now the habits of this flycatcher are similar to those of its congeners, its prey being taken chiefly on the wing, and when executing this feat, the lower surface then being fully exposed, the bird presents a striking

appearance. In the bright glare of the burning sunshine, this little bird, when hovering in the air in pursuit of its invisible prey, seems the very essence and genius of fire.

At two points not far distant from the house I found pairs of zone-tailed hawks breeding, soon after my arrival. The white-necked raven was frequently seen, and its hard guttural croak often heard, while the raven proper was not so common. Humming-birds darted everywhere, and at least two kinds were nesting, while several others were often noticed. The black-chinned humming-bird is almost precisely like our ruby-throat of the East, save that the gorget appears black, but when seen in the proper light reveals a deep royal purple. The other, Costa's hummer, rather smaller than ours, besides having a beautiful violet cap and throat, has this exquisite color extended in a point downward on either side of the neck. It always made me think of a dandy with a fine flowing beard of gorgeous tint, carefully parted in the middle and brushed to points on either side.

The hooded oriole is a golden bird, relieved by black, something like an orchard oriole in shape, but even more slender; and it is a little larger. These orioles were present everywhere in the trees along the river. Yellow-headed titmice were breeding on the mesas to the south of the river and in

many of the cat-claw thickets, while cactus-wrens, Palmer's and crissal thrashers were more perceptible to the ear than to the eye in every patch of cholla.

Clumps of cholla also offered refuge to the chaparral-cocks, to covies of Gamble's quail, and were favorite nesting places for thrashers, cactus-wrens, and road-runners. The mourning dove, the white-winged dove, and the ground dove were the noticeable pigeons. Kingfishers, while not abundant, were frequently discovered on the river. Gairdner's woodpecker was uncommon, and the Texan woodpecker, the Gila woodpecker, and red-shafted flicker were numerous.

At dusk the little whippoorwill mentioned as occurring along the road could always be seen and heard, and a little earlier in the day many Texan night-hawks circled the air. The white-winged blackbird, the meadow-lark, and Brewer's blackbird were all common. The house-finch, the prototype of our purple finch, was one of the familiar sparrows, rivalled by the Arkansas gold-finch. The black-throated sparrow and the desert song sparrow bred in the vicinity, and Lincoln's sparrow was met with as a migrant, while the lark-finch was a conspicuous member of the sparrow population. Cooper's tanager, the cliff swallow, and the western warbling vireo about completed the summary in a general way.

I have enumerated these birds without dwelling much upon their habits and characteristics; but a future chapter will, I trust, show sufficient reason for this.

The altitude of Riverside above the sea is given by the Government Survey as twenty-two hundred feet. The only other locality where I made anything like a detailed investigation of bird life at this time, and there only for a few days, was at the headwaters of Mineral Creek, not far distant, an altitude approximating five thousand feet. Here most of the birds seen at Riverside were also found. Once I saw a great blue heron fishing in one of the pools high up in the mountains, and the black-headed grosbeak and the black-throated sparrow were both found breeding in early June.

I will now briefly discuss some of the salient features which characterize the watercourses and mountains of southern Arizona. The conventional conception of a river would be wide of the mark here. The rivers are fed, as all properly constructed rivers should be, by the tiny streams and brooks that flow into them through the more considerable branches into which they ramify. If it would not be too Irish a way of putting it, I should say that the mouths of the streams in this part of Arizona are characterized by absence of water. For instance, I

have spoken of the Gila as a rushing mountain torrent in the vicinity of Riverside, and at Florence it was considerable in volume, though somewhat smaller. Now, the Gila is one of the chief branches of the Colorado River, joining it in the vicinity of Yuma; but there are long stretches of the Gila between Florence and Yuma which, save in times of extreme freshet, do not present any water at the surface.

Mineral Creek was a very pretty mountain creek high up in the Pinals. The farther one travelled its course from its source to where it joined the Gila, the less evident became the water at the surface. First it was a brook of considerable extent, then it became a series of detached pools. These occurred presently at long intervals, and finally, for the last five miles, the stream was traceable only by the dry bed which carried the superfluous water of freshet times. I may summarize the situation by saying that the characteristic of the watercourses of Arizona is the sinking below the surface of the visible stream as soon as the arid stretches of desert away from the mountains are reached. The alluvium at these points, besides being dry and parched and of great depth, is sufficiently loose and gravelly to allow even great streams of water to percolate through and flow as streams, when bed-rock is attained often far below the surface.

Watercourses may be traced in Arizona in every direction, but it is seldom that they are characterized in the desert region, or far from the hills, by any visible water. It is true that, at times, the rush of water, where it is seen, perhaps, but once in a lifetime along such a dry wash, may become so violent as to preclude the passage of the stream. Great freight teams, of eighteen or twenty mules, travelling down these natural road-beds, have been obliterated in less time than is required to speak of the catastrophe. But in a short period, at the most a few hours, the torrent has passed, and whatever water seeks this channel of escape flows again beneath the surface, which presents in an infinitely short time the dry, sandy bed indicative of the stream below.

The general trend of the broken mountain-chains of Southern Arizona is approximately northeast and southwest. The side of these ranges facing the south is usually precipitous; the escarpment rises almost abruptly out of the plain, often as naked walls of rock. The verdure is necessarily scanty. A giant cactus may find lodgment in some crevice of the rock, or a stunted mesquite tree cling in some fissure. The whole aspect of such a mountain, viewed from the south, presents a most forbidding appearance. It is a skeleton, bare and naked, with not one soft touch of verdure; the

pinnacles of rock which compose it are clearly cut against the sky. Approach one of these ranges from the north, and the ascent is not only gradual, until near the summit, but the entire set of conditions prevailing on the other side of the mountains are absent. A series of table-lands, mesas, and natural terraces rise gently one above the other, so that the effect in the distance is one of long and gradual ascent. These mesas are flat plains, covered with characteristic desert flora, until about four thousand feet altitude is attained. Here the grass becomes much more luxuriant, and besides the mesquite, live oaks are distributed over both the mesa and the sides of the hills, so that the whole effect is park-like. There comes, too, with a higher altitude, a considerable variation in growth and variety of deciduous trees, and finally, at about eight thousand feet, pines stretch to the face of the precipices on the exposed Southern side. Such forests are only rivalled by those of the Sierras in California. Here the giant pine and spruce present a sombre wood of great beauty, well watered by ice-cold mountain streams, the very antithesis of the desert conditions but a few miles distant.

The traveller who cares to visit a range answering my description, need only stop on his journey at the city of Tucson. From the railway he may

view the panorama of the Santa Catalinas, stretching just to the north, only some twelve or fifteen miles away, bald, naked, and monumental against the sky.

From Tucson a journey of six hours on horseback will bring the rider into the valley of the Rio San Pedro; another hour will suffice to reach that stream. The whole northern slope is now revealed, and may be ascended by the rider to the grand pine woods on the very summit of these stately mountains. The panorama when the outer edge of the forest is approached is inspiring. The precipice descends abruptly to the plain at the base of the range. The general aspect of the scene below is desert-like. Tucson, with its clustering shade trees and cultivated fields, forms an oasis in the foreground. Then the waste stretches far away to the south, bounded only by high ranges. Towering above all, on the very horizon, yet clearly defined in the wonderful prevailing atmosphere, almost two hundred miles away, are some of the mighty peaks of the Sierra Madre of Mexico. The variety of light and shade serves to enhance the air of mystery and grandeur which prevails.

CHAPTER IX

SOUTHERN ARIZONA

DURING the two months' stay in Arizona, in the spring, I became convinced that my own interests demanded a residence of considerable time in the territory. This scientific reconnaissance had also shown the richness of the region in bird life, and made me most desirous to continue my investigation.

On my return to Princeton in June, I applied to the trustees for a year's leave of absence, which was granted. In October I again returned to Arizona, this time accompanied by Mrs. Scott, Mary, the faithful friend who had shared our earlier wanderings, and Grouse. Mineral Creek gave us a taste of true frontier life, making previous experiences in Colorado and Florida tame by comparison. Our camp was on the very outskirts of civilization. The rough wagon trail to Riverside, forty miles distant, passed through an entirely unsettled country.

The Prices, our sole neighbors in the cañon, were nomads from Pike County, Missouri, whose wanderings had brought them to this remote

valley, where they lingered for a time, to fatten their small band of cattle and hogs.

Of our more distant neighbors, the Apaches, fourteen miles away across the range, at the San Carlos Reservation, we were often reminded. Mountains to them were no barrier, and forays on unprotected ranches or camps were by no means uncommon in those days. The attack was usually made at early dawn, and came with such sudden fury that there was little chance for escape. The Indians at San Carlos were supposed to be under strict surveillance, but now and again a band escaped. Sometimes, too, numbers would be permitted to go out to gather the mesquite bean or the fruit of the saguaro. These rovers, called good Indians on the reservation, became demons the moment the white man was at their mercy.

Shortly before our arrival the Prices had been warned, by a scout sent on horseback, that the Apaches were raiding and headed toward Mineral Creek. Instantly they made ready; the mother and three children were placed on one horse, the grown daughter and two more children took the only other horse, the men seized their rifles and another child each, and so they started at night across the mountains to Globe. Climbing the steep, rough trail, over rocks and logs, along the edges of precipices, they hurried. Suddenly the mother looked behind her: a child was

missing. A halt was made, one of the men went back and found the poor, frightened little creature a mile away. Then they struggled on, sought shelter in Globe, and there remained till the troops forced the Indians to return to the reservation. Until the final capture of Geronimo, the number of settlers killed annually could be counted by the hundred. Residence in these remote regions was attended by a constant sense of danger.

The miners in my employ built for us a rude but comfortable cabin, with chimney and open fireplace, that indispensable adjunct of camp life.

Early in December I completed my work here; but as the bird life of the region has been touched on in a previous chapter, and is dealt with fully in the bibliography, it will not again be dwelt upon.

The attempted regeneration of the Price family afforded Mrs. Scott an interest for her unoccupied moments, and in this effort she had Mary's earnest support. They began with two of the younger children, Bob and Nan, eight and six respectively. Turned out early in the morning, with tangled hair, smutty faces, and unwashed bodies, their scanty clothes, securely fastened, removed only through wear and tear, these little waifs were wholly uncared for, and left to shift for themselves. But soap and water, comb and brush, vigorously applied, accomplished marvels. A new blue frock for Nan, a clean suit for Bob, effected a further

transformation, and made us acquainted with two bright-eyed, attractive children. The daily visit was a pleasure. They delighted in helping Mary, watching me at my work, listening to stories or in telling us about the calves, the pig, the coyotes that came to the corral at night, and with open eyes of the big bear shot by "Dave and Paw."

A business journey to the East in December took us away from Mineral Creek, and the time of my absence was spent by Mrs. Scott in Tucson. On my return we devoted several weeks to an exploration of the outlying country. Twelve miles northeast of the town, in the foot-hills of the Santa Catalinas, beyond Camp Lowell, is Agua Caliente. The Hot Springs are approached through a forest of the giant cactus. The word forest alone describes the closely massed columns of the saguaro, scattered over the vast area, almost to the exclusion of other plant life.

The hard, woody ribs that surround the pith of the cactus, like the staves of a barrel, are pierced in many places by Gila, red-shafted, and gilded woodpeckers, who find in the soft central mass a material readily excavated for domiciles. The general habit of woodpeckers is to seek new nesting places every year. The abandoned cavities of former seasons are promptly preëmpted by two kinds of owls, the Mexican screech owl and

a miniature species known as Whitney's owl, peculiar to the region. Sparrow-hawks, too, delight in becoming tenants. The saguaros in the neighborhood of Agua Caliente afforded excellent opportunities for studying the habits of Whitney's owl, but my chief difficulty was to get close enough to the opening of the nest. The birds were far from shy; they sat in the open doors of their retreats, paying no attention to the passer-by. A light sectional padder readily carried in our "ambulance" solved the difficulty.

At Camp Lowell generous hospitality always awaited us, and it was one of the pleasures of our stay in Tucson to visit our friends at the "Post." In my frontier life I have received unfailing kindness and consideration from officers in both branches of the Service. No body of men I have known have wider scientific interests.

Early in the spring of 1883 I looked for a point at which to continue my ornithological work. The northern slope of the Santa Catalinas was finally chosen for personal as well as scientific reasons. Pepper Sauce Gulch was the site of our new home. I built here a simple cottage of bungalow type, with wide-spreading roof, hauling in the lumber fifty miles from Tucson. The material used was California redwood, and this served not only for walls, floors, and shingles of the roof, but was converted readily into the win-

dow seats, book-cases, dressing tables, and bedsteads that formed our furniture.

The rooms were hung with cheap calicoes of pretty design. Bear and deer skins, Mexican serapes, and Navajo blankets made effective rugs. When in all its completeness the cottage appeared for the first time to the astonished gaze of Jesus Maria Castro, our Mexican neighbor, he exclaimed in Spanish, "Behold the Little Palace of Montezuma!" This romantic name it bore ever after.

Pepper Sauce Gulch in the Old Hat District, on the north side of the Santa Catalina Mountains, winds down to the valley of the San Pedro River. The upper reaches of the cañon run between abrupt hills, which tower on either side for about a thousand feet. The sides of these hills are grassy, and the timber consists almost entirely of a kind of live oak.

Close to the house good water was abundant in the bed of the cañon, but for our use was piped from a spring high in the mountains. The site of the "Little Palace" was on the side of a hill some hundred feet above the bottom of the gulch, the hills being here so steep that it was necessary to cut out a shelf for the main part of the floor. The beams, which projected far beyond the excavations, were supported by uprights rising from the ground below; it was in this respect like a Swiss chalet. On the side of

the dwelling toward the cañon, a wide piazza, or balcony, faced the hills opposite. This balcony extended all along the front and one side of the house, and the entrance to it was from the steep, winding trail which led up from the bottom of the cañon to one corner at the rear. The nearest neighbors were ranchmen, some three miles distant, and mail was brought twice a week to a place known as American Flag.

The altitude of the region just about the house was five thousand feet above the sea level, and therefore about halfway up the side of the range. Game was extremely abundant; deer frequently grazed under the trees, near at hand; and a walk in the cañon in the morning often revealed the tracks where bear had passed during the night. Coyotes held their moonlight concerts on the hills back of the cabin, and jack-rabbits and their smaller allies gambolled in the undergrowth. Squirrels scampered over the rocks and among the branches of the trees everywhere, and many birds frequented the vicinity, because of the abundance of water and the growth of trees coincident. While the cactus was not so conspicuous in this landscape, the mescal or agave grew on all the hillsides, and at midsummer these graceful plants, with their high spike sustaining a large cluster of compound flowers of a deep orange hue, added to the beauty of the scene. These blossoms

were frequented by myriads of humming-birds. The yucca, or soap-weed, was also common, and afforded a nesting place for a kind of bird known as Scott's oriole. This is a bright, lemon-colored oriole with a black head, much like his cousin the Baltimore of the East, but larger. This bird's method of nest-building I have discussed in a paper, but will briefly summarize it here.

Most of my readers are aware that the yucca is a plant with a cluster of long, broad, dagger-like leaves, terminating in a fine, sharp point, whence it receives the name of Spanish bayonet. The older leaves at the lower whorls are constantly falling away, and frequently this plant attains considerable height, sometimes ten or twelve feet, with a bare, palmlike stem supporting the head of broad leaves at the top. The lower leaves as they die become pendent, drooping close and parallel to the trunk. Among such leaves, at their first period of decay, Scott's oriole builds its nest. This is done by picking the chlorophyl away, leaving the stringlike skeleton, from which the characteristic hammocklike structure of the oriole is woven. When complete, this nest is similar to that of the orchard oriole of the East, but is wholly concealed by the drooping leaves, being situated between them and the trunk of the yucca. Moreover, it is well protected

from inroads of enemies by the sharp points of the leaves themselves.

Now it happened that, in connection with my business, machinery was employed, to clean which, and to wipe away the oil, cotton waste was used. This waste was thrown away with other refuse not far from the house. In the spring succeeding our settling here, the orioles discovered bunches of this waste, and in at least two cases abandoned their former and almost invariable method of nesting in the yucca, and built conventional oriole nests in the oak trees. This is dwelt upon as evidence of the changes brought about by immigration into a new country in the habits of the wild animals which live there, without any intention on the part of the settlers.

In this remote cañon we were able to have a number of dogs and other pets without annoying or disturbing our neighbors. Grouse was pre-eminent, and as companions of his own kind there was Bull, a coarse-bred mastiff, two or three mongrel black and tan terriers, and a varied assortment of nondescripts, aggregating some twelve dogs.

A red-tailed hawk taken from a nest in the vicinity of Tucson was now a year old. "Peep" had never known captivity; that is, he had never been in a cage or enclosure. Usually he was allowed to roam free, and when confined, was

tied by a thong fastened around one of his legs. He became very tame, and would come to call. Very soon he began to associate my excursions with something to eat, and before we had been in the mountains a month, he always accompanied me when I started away from the house with a gun. I found out that the easiest way to get rid of him was to kill as soon as possible a squirrel or lizard. Otherwise he would continue with me, and the first bird which I collected, no matter how rare, would be pounced upon and carried off to the nearest tree. At such times he would not answer the customary call, and it was impossible to get the specimen from him, whether bird or other animal.

During the summer one of the miners killed a deer not far from the house, which had a new-born fawn, perhaps some two or three weeks old, concealed in the grass near by. This little foundling I took to the house, where it became a member of the family, remaining with us until our return to the East, when I gave him to a neighboring ranchman. The buck was then over three years old, and nearly full grown, with a fine set of horns indicative of his age. At first he was a tiny brown fawn, spotted all over with white, beautiful and gentle, and after a few hours, very tame. Like the hawk, the fawn was never confined in an enclosure. When old enough to ramble away, he did so at

pleasure, his only protection a leather collar, from which hung a bell to warn any hunters against mistaking him for a wild animal. He was known to the settlers and the Mexicans about the country, and was frequently seen ten miles away from the house. He became famous in the region, receiving the name of "The deer with the bell." Often on his rambles he was accompanied by several of the dogs, and not infrequently by the entire troop.

The fawn began to be very playful when six or eight weeks old, and every morning would go to the bed of the cañon and get a drink, and then gambol about on the small piece of level ground there, an exercise in which the dogs soon joined. After twenty minutes or half an hour of such playing, Venado, for so we called him, would run rapidly up the hill on the other side of the cañon, away from the house. If the dogs did not follow, he soon returned and began to play with them again, but only for a few minutes, when he once more started up the hillside; now, perhaps one or two of the dogs, or maybe all of them, joined him. The dogs were essential as watchmen, in so remote a spot, and prolonged absence on their part added to the danger always present from the Apaches and other intruders. So it was necessary, when Venado endeavored to entice his comrades to take part in his excursions,

to prevent their going. Usually some one on horse-back headed off the party before it was well under way. The cavalcade did not go very fast, but the procession, led by the deer, was soon far out of sight, trailing away over the hills. I have known the dogs and the deer to be gone, on one occasion, for five days, and so frequently were they absent over night that I ceased to be concerned, after a little experience.

These escapades were immensely enjoyed by both the deer and the dogs, and the deer came home in the best of spirits and physical condition. He found plenty of acorns and grass, doubtless, and cool mountain water. But it was otherwise with the dogs. Twenty-four hours spent without food, and worse still, two or three days, produced a great change in their appearance. They came home foot-sore, and so thin and ravenous that only very small portions of food could be given them at considerable intervals.

Not the least interesting part of such episodes was the fact that the mastiff, Bull, was a dog kept almost entirely to catch wounded deer. Seeing one trying to escape when only crippled by a ball, Bull, who was very fleet, would at once give chase, run it down, seize it by the throat and hold it until the arrival of the hunter. Yet this same dog spent hours in playing with a little fawn, and days with him on excursions to no one

knows where, in the wilds of the mountains! Where did they go? What were the happenings that proved so fascinating? Did they visit and romp with other deer? Or was it the pure pleasure of the free life and going? Who can answer?

All the dogs slept at night on the veranda, as close to one another as possible for the sake of warmth, the deer in the centre, with the cats of the household lying on top of the group. This was the usual custom, for the nights were cold in these mountains. On rainy days, or when tired, Venado would enter the main room of the house, go up to the low sofa and climb upon it, and lying down with bovine deliberation, would rest himself. Here he made a beautiful picture. His great, placid, intelligent eyes and the fine color of his hair, together with his grace of form, are more readily imagined than depicted. When contemplative, he would stay for hours in this way, chewing his cud, and doubtless ruminating on new excursions to be taken with his friends.

Among our coterie of animals, a little gray rock-squirrel was a character not to be overlooked. Often the squirrel would join the deer on the sofa, and finding some soft place in the stiff hair where it was warm, the tiny creature would curl up and take a nap. One of the traits of this squirrel was an extreme liking for comfort.

Frequently, for he was also unconfined, he would go to any one who sat reading or writing, climb up, and find his way to the hollow of the hand, where he would curl into a ball and sleep. At such times he did not wish to be disturbed, and once having installed himself, resented any motion on the part of the owner of the hand. Half awake, he made a chattering noise, and if the motion did not cease, would presently give the hand a sharp nip. If this was insufficient, a real bite ensued, so that whoever held him was at his mercy. Over Venado, when he curled in that animal's hair, he exercised the same sort of tyranny, and it was interesting to see him bully the deer into being absolutely quiet while he enjoyed his slumber.

Besides sleeping together, these animals were all fed at the same time; the custom being to make a mush of bran, with bits of meat and scrapings from the table added, the whole forming a sort of thick porridge. Some dozen bowls were placed upon the ground, and into each was poured a portion. Every animal was on the *qui vive*; the dogs, the deer, the cats, and the squirrel were all soon busy eating. There was no quarrelling; sometimes a slight admonition was given, and when the first cravings of hunger were allayed, a series of visits were paid by all the animals to each dish, changing off, much as men do after

dinner when the bottle is being passed, and coffee and cigars are at hand. These occurrences were not casual but daily happenings, and afforded us unfailing entertainment.

Not the least important member of this happy family was a large black donkey, or burro. He was my special friend, and I used him chiefly on my collecting trips; for I found him tractable, intelligent, and affectionate. He soon learned what my journeys were for, and though afraid of a gun at first, I readily accustomed him to it. After a week's practice I could fire both barrels from his back without alarming him in any way, and he soon learned to watch the bird that generally fell on such occasions. Then he would walk up to it, allow me to dismount, secure the specimen, and put it away in the basket which I carried for the purpose. If I started on foot to continue my hunt for a short time in that way, he followed, pausing when I paused, and acting as if he thoroughly understood what I was doing, and enjoyed his participation in it.

One thing he did object to. He disliked a wounded bird. Frequently when a quail jumped suddenly in front of him I would fire hastily, and perhaps wing it. At such times, the moment I threw my gun to my shoulder "burrito" was rigid; he seemed to appreciate that I was not to be disturbed. If the bird fell dead, he walked

directly to it and halted; but when a wounded bird struggled on the ground, it was a difficult matter to get the burro to approach it, and he generally preferred to have me dismount at some distance and secure the bird myself; a consummation which apparently entirely satisfied him.

At the feeding time this burro was frequently one of the party of animals at the banquet, and was apparently received with as good fellowship as any of the members of the motley company. On the days when not in use, about five o'clock in the afternoon, "burro" was accustomed to come to the house in quest of the ration of barley which was his daily portion. One could almost tell the time of day by his arrival. Often I was busy, and if the desired barley was not forthcoming, he would call me with a low whinny. At such times, if he saw me, and I paid no attention to the first intimation, he came and nudged me on the arm. If I continued inattentive, he would nibble gently at my coat, and pull it. Further delay occasioned him to back off a little way and to utter the most terrific bray imaginable; then I knew he must be waited on, for if I protracted the event further, he would rush up, seize me by the coat, and begin to drag me about. I often teased him, pretending not to be aware of his presence until the last possible moment.

Prietto, for such was his name, on account of his color, did not at all realize the conventional idea of a donkey. He was coal black in color, which shaded into fawn on parts of his legs and belly. His coat was short, and as shiny and satiny as that of most horses; he had none of the straggling hair and whiskers associated with the face of an ass. To be sure, his ears were long, but they were finely shaped, and his head was as beautiful in proportion as that of most thoroughbreds. He was the type of the best kind of jack from which the Spaniards bred their famous mules. His endurance was great. I have often ridden him forty or fifty miles, and sometimes as much as seventy miles in a day; our ordinary trips covered anywhere from fifteen to thirty miles. With all the gaits of a good horse, a particularly comfortable single foot pace was one of his characteristics. It was astonishing how much ground he would cover without apparent effort; in company with horses he always kept pace with the party. No hillside was too difficult for this sure-footed beast, and I never felt the least alarm when riding him over precipitous and perilous mountain trails. I had not a very good seat as a rider, and on several occasions when frightened by a snake or some unusual object "burro" threw me as he shied violently out of the path. Before I had regained my feet, he came up and looked me over

as if to say, "Well, I had no idea you would get off so quick; better get on again."

Such were the domestic animals about the "Little Palace of Montezuma"; and it is only necessary to speak of some tame orioles and mocking-birds to complete the list. These birds, too, though they had cages, were allowed to go in and out about the house pretty much as they pleased. Frequently, in the summer time, when reading at night by lamplight, many insects, attracted by the light, littered the table. Then one of the mocking-birds would spend a long time satisfying his appetite and instinct, catching the deluded beetles and moths hovering about. This mocking-bird was caught as a fledgling when he was perhaps four weeks old, and was reared by hand. When six weeks old, two Scott's orioles were taken from a nest; these were little fellows, just beginning to show feathers. There was only a single cage, and they were put into it, together with the young mocking-bird. Grasshoppers were the staple food, and had to be broken and fed to the fledgling orioles. The mocking-bird in no way objected to the newcomers. To my astonishment, in a few days, when I gave him a grasshopper, I saw him kill it, beat it to pieces, and then go down to the two little orioles, and into their gaping mouths place the fragments as a parent bird would do. From this time on it was not neces-

sary for me to feed these two birds by hand. All I had to do was to bring a few live grasshoppers at intervals to the cage. The mocking-bird would first supply the needs of the two orioles, and after he was assured by their quiet that they were no longer hungry, he would attend to his own wants.

We lived practically in the open air during the entire year; for at all seasons, with the mercury either at 20° or 90° Fahrenheit, the crisp, dry air made vigorous exercise a delight. Seldom a day passed without a brisk ride across the foot-hills to some remote cañon, or a gallop on the open mesas. Hours in the saddle brought no sense of fatigue.

Distant trips to the summit of the Catalinas entailed somewhat elaborate preparations, a pack train of burros, and the equipment and provisions for a stay of several days. However, securely fastened to the aparejo, on the steepest part of a trail, one or more of the burros was sure to slip his burden under his belly. Then followed much vigorous language from the vaquero, and groans and lamentations on the part of the aggravating donkey, during the readjustment. On our own saddles various latigoes held in place not only blankets and extra clothing, but the tin kettle, coffee-pot, and frying-pan that were part of the accoutrement.

Slowly the journey was made, "*poco, poco, poco*," in the expressive language of the Mexican. Strung

out for half a mile on the trail, the burros and their drivers were in advance, the riding party in the rear. At the end of a long day over steep places, following the dizzy edge of a precipitous gulch, or crawling along a "hog-back," the end of the journey was reached. Under the giant pines, by the side of a tumbling mountain brook, camp was made, the animals turned out to graze, and a savory supper of flapjacks, venison steak, and steaming coffee soon prepared by the skilful hand of our jovial cook "Billelyut," as Castro called his Irish son-in-law. Then followed a dreamless sleep on a bed of fragrant pine branches, under the starlit sky; and with the dawn of morning we awoke refreshed, and eager to begin our day's exploration.

I will now endeavor to picture something of the bird life out of doors at the various seasons, altitudes, and conditions that existed on the sides of these mountains.

Besides the orioles, the warmer months discovered just at the "Little Palace" a coterie of feathered denizens to which I can do little more than allude. The mocking-bird was of course conspicuous; the hepatic tanager bred in the live oak trees and Boucard's sparrow was the commonest finch inhabiting the grassy slopes. Throughout the deep ravines were many rock-wrens, while the little cañon wren sang its un-

rivalled song from some point of vantage on the face of every precipice.

I have spoken of the humming-birds, but perhaps have not given an adequate idea of their abundance. A kind of thistle that bloomed at midsummer on the hillsides in patches was thronged by these tiny jewels. There were eight kinds present in incredible numbers, and these were represented during midsummer in every stage of plumage.

The gray vireo, heretofore known by but few specimens, was very abundant, and bred commonly. For a paper in regard to the breeding habits of this bird, together with notes in respect to its marked tameness, the reader is referred to the appended bibliography. The least vireo was a common visitor and summer resident, and the plumbeous vireo, as well as the western warbling vireo, was plentiful, while Cassin's vireo also was observed as a migrant. The Phainopepla retired to lower altitudes in the winter, but many bred here; and again reference is made to the bibliography. The purple martin, cliff, barn, and violet green swallows were present in numbers in their season; while the tree-swallow, the rough-winged swallow, and the bank-swallow were little more than casual. The white-throated swift migrated in large companies, and sometimes appeared during winter. Vaux's swift was met with on a single occasion.

The Texan night-hawk and the western night-hawk both occurred in the hills, and the poor-will as well as the Arizona whippoorwill may be mentioned. Woodpeckers were singularly numerous. Harris's, Gairdner's, the Texan, and the Arizona woodpecker frequented the live-oaks; as did more rarely the red-naped sapsucker; Lewis's woodpecker was a migrant on the mountain sides, and in the fall great flocks of these were always present; while the Gila woodpecker and the red-shafted flicker were resident, the one locally and the other widely distributed. In the higher country these species were augmented by the California and Williamson's woodpecker; and in some regions, where the giant cactus abounded, the gilded flicker was by no means uncommon.

Among the birds of prey may be mentioned the turkey vulture, the marsh-hawk, sharp-shinned hawk, Cooper's hawk, Harris's hawk, the western red-tailed hawk, Swainson's hawk, all of which occurred either as migrants or as breeding birds in the vicinity of the "Little Palace." From the piazza I watched two golden eagles repairing their nest early in November, and these birds were a constant feature in the panorama of bird life. I have seen them catch large jack-rabbits, and carry such animals away to their eyrie with apparent ease. The Arizona jay was a common resident and bred in the live oaks, and Wood-

house's jay was notable in the same way on the hillsides, in thickets of "cat-claw." Steller's jay, noticeable at all times in the pine forests on the summit of the range, visited, as did the piñon jay, the vicinity of the house in fall and winter. There were many ducks on the San Pedro during the migrations, and rails, ibises, and herons were frequent about the pools of that river. Space does not avail for a fuller enumeration. My papers on the subject set forth in great detail the result of observations made here. The pine forest on the summit of the Sierra Santa Catalina was prolific in bird life. This was of great interest, revealing such rare birds as the olive warbler, Stephen's vireo, the painted redstart, and the red-faced warbler. Wild turkeys gathered here in great bands. In addition, crossbills, evening grosbeaks, hermit-thrushes, and several kinds of snowbirds bred at this high altitude.

Nor must it be forgotten that, outside of all this bird life, other animals were conspicuous. Lizards of brilliant hues and various sizes basked in the sun on the hot rocks, inflating brilliant pouches under their throats, and seeming the concentration of heat and fire. From what I have written it is evident that the rattlesnake was by no means uncommon; yet I would not convey the idea to any one that there was associated with the presence of these snakes a large

element of danger; and here I think I must dwell on the fact that most of us exaggerate in our minds peril, not only from rattlesnakes, but from snakes in general. I heard rattlesnakes much more frequently than I saw them; perhaps I did not see more than fifteen during my whole five years' stay in this region; for by day these serpents are sluggish, and it is at night that they travel most. Their presence, too, is apparent only during the warmer portions of the year; and from October until April to hear or to see one was unusual. It was generally at night-time that the horses were alarmed by "rattlers" crawling in the trail, and it was then that I frequently heard them. Days and months passed by without seeing this or any other kind of snake; and yet I suppose there are as many rattlesnakes in this part of Arizona as at any place. Nor have I been able to learn of an authentic case of snake-bite in this territory resulting fatally. It does seem that our dogs, running all over the country as they did, would have suffered in this respect; but they were never bitten nor did I learn of others having suffered.

Foremost among the lizards was that famous animal, the Gila monster. This is a repellent-looking creature; but again from experience I believe that danger from it is practically *nil*. This lizard I saw more frequently than the rattlesnake.

The Gila monster is a large, sluggish, thick, stumpy lizard of an orange color, decorated with black and brown, and often attains a length of more than two feet. One met with them in dry washes or on some arid point on the mesa, and, unlike any of the other lizards, they were extremely slow in their motions, reminding me always of turtles by their gait and deliberation in moving. When approached, they made no attempt to escape, but would lie still and inflate themselves and hiss, opening the mouth and darting out the forked tongue, so rapidly as to resemble small flames.

The legends which the Mexicans narrated, regarding the poisonous qualities of this animal, and their evident dread of contact with one, do not seem to be borne out by the facts, as will presently be shown. However, for the sake of those who have not heard such tales, I will recite an incident that occurred to a "friend of a friend of a friend" of Castro. Castro told it to me himself. He said that this friend of his friend's friend made a camp one night in a dry wash shortly after dark, spread his blankets on the ground, and, being overcome by the journey of the day, was soon sound asleep. Now, he did not arrive, as was expected, at the point to which he was travelling; after a day's waiting, which the Mexicans would consider great haste, a party

started out in search of him. They found him in the dry wash seemingly asleep on his blankets, but when they attempted to arouse him, they discovered that he was dead. Uncovering his body, they raised it from the ground and began to roll up the blankets preparatory to carrying them and the dead man to a suitable place for burial. These blankets, for the purpose of comfort, were laid on the ground to the extent of five thicknesses, and when the last was lifted, a Gila monster was discovered lying between it and the sand. The mystery was then clear to the searchers, and they repaired to the ranch with the body. Arriving at the point, and preparing the corpse for burial, they discovered on the man's back, outlined in red and decorated in many fantastic colors, the exact imprint and picture of the Gila monster on which he had lain. I was not able to ascertain that he had been bitten, but Castro informed me that that was not an essential or important factor in the case; for, he said: "It is only necessary to be in the neighborhood of one of these monsters, and if it does as much as breathe upon you or your clothing, there is no power of medicine or grace of God that can save you from certain death."

This is only one of many stories of similar character which I had related to me by various people at sundry times during my residence in

Arizona. My personal experience absolutely belies them all. For instance, I had in Tucson a pet Gila monster, which lived in our room at large for a period of three months. It had excavated in one corner of the adobe wall, behind an olla, a little hole to which it retired; but daily it appeared, crawling about the floor, and I have frequently held it in my hands, stroking it and examining it closely for long periods. It was fed occasionally upon an egg, which for this purpose was broken into a saucer and presented to the animal, which would lap it much as a dog or a cat does milk. Then "monster" would retire to sleep in the "burrow," and might not appear again for twenty-four or forty-eight hours.

One day when Mary was sweeping the room the Gila monster lay in the middle of the floor basking in a patch of sunshine in his usual indolent and sluggish fashion, and Mary, being in a hurry, grabbed him up quickly to place him to one side out of the way, whereupon he seized her by the thumb, which he grasped and bit until the blood ran. In her efforts to rid herself of him, for he was holding on tight, she tore away a considerable portion of skin. Of this happening we were not aware at the time, and it was only after several hours that, noticing Mary with her thumb done up in a bandage, I asked how she had cut her finger. She answered in the most non-

chalant way that she had been bitten by the Gila monster, and seemed to consider it a matter of slight importance. I was somewhat worried, because I had heard so much of the deadly results that ensued on such a bite, and applied such remedies as were at hand, but kept my fears to myself. She suffered no inconvenience, more than one would from any scratch or cut, and in a few days her thumb was healed, and all traces of the wound disappeared within a week.

I had these animals about the house for months at a time, and while I never thrust my fingers into their mouth to be bitten, I handled them, as I have said, much as I would a dog or a cat. After a while they always became tame. They frequently emitted the blowing, hissing noise, and darted out the forked tongue when disturbed; otherwise I have not seen them offer to be in any way harmful.

Among the insects the tarantula was not uncommon; but this spider has been so often described by writers that further discussion of it seems unnecessary. Truly, it is a hideous brute, with its long hairy coat and evil-looking face! Centipedes about three inches long were numerous; with these two examples I think I have enumerated the insect horrors of the region, and I have never met with any one who suffered serious discomfort or injury inflicted by either of these animals.

Four-footed creatures abounded; I have spoken of the deer and the bear, of which there were many representatives, the former often gathering in large bands. The common deer of the hill-sides was the white-tailed deer, and that of the mesas and lower altitudes was the black-tailed or burro deer. On the plains, where they had not been exterminated by constant hunting, antelopes were still plentiful. In every considerable region of prickly pear, especially in the vicinity of water, bands of peccaries congregated, sometimes as many as seventy-five or a hundred individuals being together. I have seen these wild pigs on many occasions, and have frequently been on foot among them; while I have had dogs severely handled by wounded animals, or by one at bay, the peccary did not bear out, as it occurs here, the stories narrated of it. Now and again I have met a solitary sow with a litter of young, and on one occasion caught two of the little fellows and brought them with me to the house. Even then the mother did not resent the robbery any more, and not as much, as most domesticated pigs would.

On the San Pedro, near the termination of the mouth of the Old Hat cañon, was a very considerable lake made by a fine beaver dam. This was the resort of many ducks and wild fowl during the migration. It was difficult to see a beaver,

though their presence was evident, and the only sure way to accomplish this was by a long visit on some bright moonlight night. Then, the watcher, sitting absolutely quiet on the bank, would see numbers of beavers appear and proceed with their ordinary avocations, but they were so alert that the slightest motion or noise on the part of the observer was at once perceived and caused the animals to retire, when it was useless to wait for their return.

Skunks of three kinds were numerous; and I have spoken of coyotes. There were many foxes and wildcats, and the mountain-lion or panther was by no means unusual. I have seen all of these animals alive many times, and have killed representatives of most of them. One of the prettiest wild creatures of the region was a little beast known to the natives as the civet cat; it was twice as large as a gray squirrel, with beautiful fur, a foxlike head, large, intelligent eyes, and a bushy banded tail of white and brown that made a fine contrast to its silky fur. It was nocturnal in habit, and was to be obtained only by trapping, or by searching in caves or hollow trees where it slept during the day.

The bears spoken of were the cinnamon variety, much larger than our black bear of the East, and known generally to the natives as "grizzlies." One that I killed in the Pinals was

estimated, by a quarter that was weighed, to exceed eight hundred pounds. At places in the mountains the trails that these bears made, in passing from the manzanita thickets where they slept in the daytime to the live-oak forests where they fed on acorns at night, looked like well-worn highways, and the number of animals that wore such beaten paths must have been great.

I have encountered all of these animals, and here again must speak of the element of danger. In all my experience in hunting out of doors, I have yet to see the beast that would not go its own way if left alone. The very rat or mouse when cornered will fight, and so will a grizzly bear or a deer, and perhaps any other creature. I have never seen one, and I include them all,—snakes, alligators, wildcats, mountain-lions, peccaries, and grizzly bears,—that would not, if unmolested, pursue its own way without manifesting interest in the presence of the individual who had intruded.

It is worthy of note that in this part of Arizona there are two spring seasons during every year. These follow the rainy periods, as I shall presently show. In January and February there is a considerable precipitation; late in February and early in March the ground has become sufficiently damp for the various seeds, that have been lying ready to sprout, to germinate, and presently the

arid mesas and desert plains are decked with a coat of verdure. Then, on the lower deserts the California poppy blooms in great luxuriance, so that the country, viewed from some little elevation, presents a vast prospect covered with a golden crop,—a field of cloth of gold, for the flowers are not dissociated or in groups, but are distributed evenly over the entire area.

The rainfall is never of long duration, at most not more than four or five hours, and it occurs generally at night. It comes more in the form of a showery day or night, and such a thing as a real rainy day I have never seen in this part of Arizona. By the last of March the rapid evaporation has dried the surface again, and the powerful sunshine soon burns and browns the verdure, so that by the middle of April or the first of May the only evidence of the luxuriant vegetable growth that had carpeted the ground is to be found in the dried grasses and flowers which have gone to seed. The whole surface is now quite as brown, bare-looking, and more arid than in mid-winter. Late in June, and for part of July, there is a shorter rain period, which generally occurs annually, but in some seasons is very slight. This rainy season may last for three or four weeks, and is characterized by the same succession of showers, of even shorter duration than those that occur in the late winter months.

After this rain the country again presents for a brief period a most luxuriant vegetable growth of grasses and flowers. Chief among the latter is a kind of convolvulus, which, when in bloom, covers the plain about the middle of July with a blue carpet rivalling the gold of the poppies in March. Coincident with this, the yucca raises its white stalk of waxen bells, and the whole presents a scene the very antithesis of one's idea of a desert country.

A short sketch of a friend who was of great service to me in many ways during my long stay in the Santa Catalinas will round out the story of that region. He was conversant with every part of this wilderness, and as a hunter had few equals. While he spoke no English, he taught me the Spanish dialect of the country. I came to know the local birds and their habits, and learned the musical Spanish names that really seem to belong to the beautiful creatures, when Castro went with me afield.

The conception that most of us have of the swarthy Mexican is conventional, and is in a general way correct. They are lithe, dark-skinned men, with straight, black hair, and eyes like sloes. Gay and debonair in manner, they are nervous and excitable, and generous and hospitable to a fault, but withal improvident. Jesus Maria Castro was in appearance the exception that proves the

rule. He was of the blue-eyed, golden-haired Castilian type that few of us associate with that people. Moreover, his hair was wavy, a quality even more noticeable in his flowing beard. A man of romantic disposition, of great kindness, and prodigal generosity, he had never saved for himself out of all his earnings nor from his opportunities any property. When I knew Castro he lived with his wife and younger children in a rude adobe cabin of a single room. I never rode by the door of Castro's cabin but that the Señora came out, greeted me profusely, begging me to alight and rest myself in the shade of her piazza. When I had complied, she always informed me that everything she had belonged to me, and began immediately to dispense such entertainment as was possible. This generally consisted of a cup of tea and tortillas, sometimes supplemented by some little dainty that she had kept for an event of this kind.

As I sat in the shade of the rude piazza consisting of four posts overlaid by branches gathered from the trees, I felt that a great privilege was granted me. Never have I been entertained with better intent; and though I realized that the tea which I was drinking was made of grasses and herbs gathered not far away, and probably only a little while before I dismounted; that the flour of which the cakes were made

might be the last in the bag; and while the cup was generally saucerless and often cracked, all this did not detract from the favor which was conferred. Looking inside the house I could see the bare mud walls and ceiling, the one bed, the meagre cooking apparatus, and the few chickens which were an inevitable part of a Mexican establishment; for they occupied the interior of the house jointly with the proprietors. The family were very poor; but I think I have never seen happier people; they were like children in their irresponsibility. Yet, when I knew them, Castro often informed me that he had seen worse times; and when I first spoke to him of the possibility of bettering his condition, he smiled and then related to me the following story. This occurred on one of our hunting trips together, and we participated in many.

He said that some six or seven years before, when employment in the country was difficult to obtain, he realized as he went to bed one night that all the available provision for his family was consumed; in short, there was absolutely nothing for breakfast the following morning. I can well imagine that he went to bed, as he told me, somewhat depressed; but I do not believe that, even under these circumstances, he lay long awake. However, he went on to state that, after having slept some time, he awoke and went to the door

of the cabin, where he perceived by the situation of the constellations of stars and other phenomena of the heavens, with which he was familiar, that it was about an hour before daylight; and it occurred to him that probably the best way to supply the lacking breakfast was to take his rifle and the few remaining cartridges which he possessed, and go in quest of a deer or other game. Going to the rack on which hung his gun and ammunition he took them down, performed such a hurried toilet as time allowed him, and immediately started forth. He narrated to me in great detail the route which he traversed. This led him over a path with which I had become well acquainted, as we had often ridden over it together.

Few people in this country walk, but this time Castro was on foot; for even the horse, which is a Mexican's last property to be sacrificed, had been parted with. After passing over some two miles of the trail he arrived at a point where, from the bottom of the arroyo, the grassy hills covered with live-oaks rose on either side. Pausing at this spot, the gray of dawn was sufficient for him to distinguish a fine buck feeding on fallen acorns under one of the oaks on the hillside. He was not at all nervous, took very deliberate aim, fired, and the deer fell. He then climbed the ascent, cut the animal's throat, hung the carcass in the nearest tree, disembowelled it, so that it might

cool, and now, tired from his successful effort, he waited a while to rest, before returning. He seated himself on the nearest boulder, took from his pouch his paper and tobacco, and leisurely rolled the inevitable cigarette with which the Mexican passes every moment of quiet and many of action. He described the whole process of making the cigarette, striking the light, and his enjoyment of the first whiffs of the consoling weed.

Every man, and especially every Mexican who lives in this part of the world, is a practical geologist and mineralogist, and one of the most natural actions is to break and chip away bits of any rock near at hand, to see what mineral properties, if any, it may possess. After rolling his cigarette, mechanically Castro did what I have seen him do many times. Reaching down he grasped the nearest fragment of rock, and began to chip away a corner of the boulder on which he sat. The first bit that was broken from it disclosed a mass of silver.

At that moment, before he had time to examine the treasure further, some slight noise awoke him, and he knew it was all a dream. But he was now really awake. Going to the door as he had done in his dream, he perceived by the situation of the stars in the heavens that the day was not far distant, and he resolved to fulfil every

detail of the vision. Taking down his rifle he tried to do so with exactly the same movement, he clothed himself in precisely the same way, he set out on the trail, going, as nearly as he could, the same gait. Arriving after some time at the arroyo, he paused, looked up on the hillside in the first gray of the dawn, and there, under the oak tree, he perceived standing a fine buck. With great deliberation he aimed, and fired. The animal fell. Climbing the ascent he cut the dead deer's throat and hung the carcass in the nearest tree, disembowelled it, and sat down on an adjacent boulder to rest himself while it cooled. Then from his pouch he took his tobacco and paper, and proceeded to make his cigarette. Doing all this with great care and deliberation, he lighted it, and after enjoying a few whiffs, he leaned over, picked up a small piece of rock, and chipped off the corner of the boulder on which he was sitting. It was, not pure silver, but almost entirely virgin gold.

What Castro did in the next hour he could not describe coherently; for a short time he doubtless lost his wits. Great rocks of pure gold are not frequent in the Sierra. To Señora Castro I am indebted for a description of her husband on his return to the cabin, shortly after sunrise. She said he appeared to her coming down the side of the hill clothed only in his shirt and shoes; upon

his back he carried what seemed to be two bags, that were in reality his trousers. He had tied up the bottom of each leg and filled it with the golden fragments of the boulder which by some means he had broken to pieces. He had also brought with him a small portion of the deer, upon which they made a hearty breakfast. Then taking his small son, Sisto, with him, and better equipped than on his first expedition, he revisited the scene of his labor. By twelve o'clock he had again returned with all of the remaining portions of the boulder, as well as the carcass of the deer.

I shall now go on with the narrative of what ensued as he recounted it to me; and the strangest part of the story is that, whether or no he had the vision, the reality was actual. The cashier of one of the banks in Tucson assured me that the institution had paid to Castro twenty-seven hundred dollars in gold for the results of his half day's work. Many of the fragments were kept by the discoverer as specimens of "gold in the quartz." Even at the period of our friendship Castro still held on to a few of these.

But to go on with his own story. He said he now realized what it was to be a rich man, and he began to consider what his duties to himself and his family might properly be. Among these he conceived that the education of his children was paramount, and decided to make this his

chief end. Further, he thought it behooved him to celebrate so great an event by a fiesta of modest proportions, and to accomplish both these ends he journeyed with his children and family to the city of Tucson.

Here he rented a small house, and summoning all his co-madres and com-padres together, the fiesta was duly inaugurated, and the children were put to school. There does not seem to be any institution among people in other parts of the world, or any relationship, that compares with or is like the bond which the Mexican expresses by the terms co-madre and com-padre. Perhaps it is enough to say that it embraces all kinsmen, intimate friends as well as others, not only those to whom obligation is felt, but also many who are obligated. I leave the imagination of the reader to depict the royal manner in which Castro at this time must have dispensed his hospitality. Rumors of it have reached me through his son-in-law, one Billy Elliott, a giant, red-haired Irishman, a happy-go-lucky nomad who had travelled far as a rolling stone, and had finally settled down to the occupation of a miner and prospector in this remote region. His description was both florid and graphic.

But alas for good intentions! Prosperity thus acquired is traditional for its evanescence. It is said that all the "forty-niners" who retained their

wealth for any lasting period can be enumerated on the fingers of one hand. Fortune so easily acquired seems endless, and its disbursement is not heeded till accomplished.

Castro was no exception. How long the fiesta lasted I do not know. The "education" of the children was completed with a rapidity that probably satisfied the recipients. In short, in a few months Castro and his family returned to the little cabin in the Sierra, perhaps wiser, and certainly happy. They were always that. But the gold found in the boulder had all vanished; and future efforts on the part of Castro and others to find the ledge from which it had "floated" proved unavailing.

I have told these stories of this man, with whom I was constantly thrown during three years, for two purposes. First, that one may get an idea of the general air of romance that prevails among the people; for, while I am persuaded that the incident is substantially correct, the glamour thrown over it by the description, and the wealth of the language in which it was expressed, adds greatly to the narrative, which seems to me, as I have told it in English, to lack the vitality and picturesqueness of the Spanish in which it was recited by Castro. Second, to impress the fact that the vicissitudes of fortune are borne by this people with fortitude and a good

philosophy. The Mexican may be always glad to postpone coming events to the "manana," but he does not waste energy in retrospective regrets. What has happened may afford theme for romance, but does not furnish basis for idle bemoaning of "better days."

The experiences in the mountains and deserts of Arizona related in the preceding pages involved a period of some four years. There were slight breaks, such as I have mentioned, when I visited the East; but practically all the time from the spring of 1882 until the spring of 1886 was spent in this region. I have referred to a year's leave of absence granted me by the trustees of Princeton College. At the end of this time I deemed it best to tender my resignation, and to devote myself to the business interests of which I have spoken.

From this time on, that is, from the winter of 1883, it must not be inferred that I abandoned or even seriously interrupted my work as a field-naturalist. For a time in Arizona I was diverted; but not even during this period was the work I had found so interesting wholly surrendered. The busiest day always found some hour when I could examine into the conditions about me.

I need not allude to the great pleasure that came to me during this entire time through the constant additions I was making to the sum of

knowledge, much of which has been published, adding materially to what was known regarding the bird life of the Great Southwest. Finally, winding up my affairs to the best advantage possible, I left Arizona for the last time in March, 1886, and proceeded at once for the Gulf Coast of Florida.

From 1883 until 1897 I continued my investigations independently, amassing collections which with my field notes formed a basis for numerous published contributions, generally technical in character. The collections becoming known in this way, were purchased for museums both in this country and abroad. Much of this time was passed in Florida, a season in the mountains of Virginia, and some five months were devoted to the Island of Jamaica in the West Indies. Shorter intervals were occupied by work in the vicinity of New York, in Westchester County, and in New Jersey in the neighborhood of South Orange. It is not my purpose to dwell on the two latter localities in this narrative; but I wish to elaborate at some length parts of the work that I did in Florida, to present in some detail my impressions of the bird life of a tropical island, and to consider briefly the salient features of the high altitudes of the mountains of the southern part of the Appalachian range. In 1897 I returned to Princeton, and soon after-

ward resumed my connection with the University.

All this has been told in order to trace the route that I have followed; for it has led to a kind of study that was not in any way anticipated.

This has grown to be an absorbing interest, almost to the exclusion of other fields of investigation. Yet I feel sure that the years of preparation, what Huxley calls "*Die Lehrjahre*," were an essential part of an equipment which alone would qualify me for a more original field of research.

CHAPTER X

THE GULF COAST OF FLORIDA

IN March, 1886, we left Arizona. We travelled to Florida, and Grouse and Bull alone of our animal friends accompanied us. The other members of the happy family at the "Little Palace" were provided with new homes among our different neighbors in the mountains; for though we would have gladly taken all of them with us, this was impossible.

Our destination was a little town, Tarpon Springs, one of the many new resorts that had grown up since our former expedition to the Gulf Coast. During the entire interval that had elapsed since that event, some seven years back, a vast impetus had been given to the development of the resources of Florida. The cultivation of the orange and other members of the Citrus family presented golden visions, of more than one kind, to many. This enterprise, as well as the salubrity of the climate during the winter making the whole region favorable for places of winter resort, attracted the attention of a horde of land speculators. What is known as

a "boom" had set in. Seaside winter resorts, orange groves, pineapple culture, and many other industries and enterprises, formed a seeming basis for a great future. Speedily the wilderness was transformed. Small towns and hamlets dotted the state; scarcely a portion of it had escaped.

The Gulf Coast, formerly an almost unsettled region, where only seven years before tourists were unknown, was dotted up and down with small towns, separated by intervals of only a few miles. It began to appear as if this seacoast might rival that of New Jersey in the continuity of its panorama of towns and houses.

Tarpon Springs is situated on a bayou leading out of the Anclote River, not far from its mouth. The land about is high and rolling, and formerly the pine forest reached to the water's edge. About a mile inland is Lake Butler, a very considerable body of fresh water. In the town, where most of the pines had been cut down, water-oaks and live-oaks afforded shade, cabbage palmettos were among the common trees, and hedges of oleander flourished wherever planted. In an enclosure, but a few steps from the bayou, we found a little house surrounded by such shade trees and shrubs. The house was new, built of the fragrant yellow pine (the most available wood of the district), and provided ample room for us. It was of one story, and on the whole not unlike the

"Little Palace." This became our new home, and here I again took up the study of Florida birds.

By the first of June the exigencies of the climate made it desirable for Mrs. Scott, and other members of the family who were also at this point, to seek the cooler region in the vicinity of New York. I had previously determined to remain in Florida continuously, as long as circumstances and my health would permit; and did not leave the region for nearly two years.

The first excursion of a protracted length was undertaken immediately after the departure of my relatives for the North. I chartered a sloop and secured the services of a skipper for a trip south, to examine again some of the great rookeries and breeding grounds of aquatic birds that I had formerly studied. Should time allow, I proposed also to visit other localities still farther south. At the time of starting on this trip I knew that herons' plumes, the aigrettes, had commercial value, and believed that Florida probably contributed its share. But I had no other idea than that I should be able readily to carry out the plan I had laid down for studying the breeding habits of the several herons. There was light needed in a number of directions, and problems that I felt sure could be solved without difficulty seemed to await the coming of some observer. I did not at all apprehend that, in the short period since I

had formerly been on this coast, vital and radical changes could have taken place; but the first few days of my cruising revealed conditions entirely different from those that I had anticipated, and my sojourn of six weeks served only to emphasize them.

I have attempted a picture of a great bird rookery at several stages in this narrative, and to convey some idea of the magnitude of such breeding grounds and their propinquity to one another all along the Gulf Coast. This expedition revealed the obliteration and the extirpation of almost all these vast colonies of birds. The details of all this I have already set forth in a paper, and the reader is referred to the bibliography for the title. It may, however, be well to say here that so extraordinary were the facts that I recited that Sir Alfred Newton, in his "Dictionary of Birds," under the title of "Extermination" has dwelt at length on the presentation that I made. At the time when I wrote the paper in question it was not part of my office in making a scientific record to do more than set forth very precisely the existing conditions. It was not in my province to express my opinion of the practices which had brought about the result, nor my sorrow and horror at the infinite destruction of life. I simply recited the occurrences and set forth the facts as I observed them.

It would be difficult for me to find words

adequate to express, not only my amazement, but also the increasing horror that grew on me day after day as I sailed southward. I was sick at heart before the cruise was well under way. The great Maximo rookery at the mouth of Tampa Bay was no longer a rookery; it was a deserted mangrove island. The beautiful rookery at the mouth of John's Pass was the resort of only a few frightened birds, and so it continued. At a point on the Myakka River I saw a breeding place of the little white egret in process of destruction, and at another point in Charlotte Harbor I arrived the day after a great nesting resort had, as the "plume hunters" phrased it, been "broken up." At both places the result was accomplished in the same way. To put the reader fully in possession of the method I shall go briefly into the matter.

The time when the several kinds of herons, known as egrets, wear their decorative plumes is coincident with the nuptial season. Then nature adds to their charm and beauty these superb decorations. They are worn only for a brief period, perhaps six weeks or two months altogether, and during all this interval the birds are busied in mating, in nest building, in incubating their eggs, and in rearing and feeding their young. It is a comparatively easy thing to disturb birds and to drive them away at the period of nest build-

ing. Even when the eggs are laid, the old birds will often abandon them if slightly alarmed. When the helpless young are in the nest nothing short of catastrophe will induce their desertion. The parental instinct and affection is now strongest; the perpetuation of kind, the great achievement of all life, is about to be accomplished. The consummation of that end, on which is based the strongest and most fundamental of animal passions, is about to be fulfilled. This is the time and season chosen by the plume hunter for his harvest. Now he realizes that the cries of the young birds, hungry in their nests, will surely bring the parents back at short intervals, no matter how frequently disturbed and frightened away. To accomplish his object more surely he avails himself of modern contrivances for killing. The almost noiseless Flobert rifle, with its tiny charge to speed the fatal ball, the gun whose report is hardly louder than the snapping of a twig, is his weapon. Stationed within ten or twelve feet of a nest both parents are secured in a few moments, and then the next pair are dealt with in the same way. Continuous work of this kind from daylight to dark results in two things, a vast pile of carcasses of the dead parents, stripped of their beautiful plumes, and thousands of young birds left to starve to death in misery in their nests.

Such was the scene that I saw repeated over and over and over and over again on my journey southward. Not only were the heron rookeries dealt with in this way, but on one large island I counted scores upon scores of dead brown pelicans, stripped of their plumage, and in the trees overhead were countless nests, which at the time of my visit contained the decaying bodies of young birds. Flocks of buzzards slept, gorged, on the naked limbs hard by, attesting to the horrible slaughter by the countless dead they left untouched.

A word more, and I have done. All this was undertaken and accomplished for what? For decoration to satisfy a sense of beauty? I believe it was rather to follow a fashion. I wish clearly to emphasize the fact that I do not blame the women who use these decorations, for men are the responsible parties. No woman ever wore a decoration of any kind, much less the feathers of a bird, for her own pleasure or to attract the attention of other women. The object for which women wear all decorations is to enhance their attractiveness and beauty to men, not to themselves or to each other; and as long as men care to have women's hats decorated with feathers, and express their approval by admiration bestowed, just so long will the custom endure.

Nor is this barbarous persecution confined to

herons and pelicans. Native song-birds seem now immune. Recently, however, the wilds and fastnesses of New Guinea have been levied on for the plumes of those exquisite birds, so long mythical even to naturalists, "the birds of paradise." These are of such incredible beauty in color, in texture, and in form, that when the first skins of birds of paradise came to the notice of naturalists, the myths connected with these birds (which no scientific man had then seen alive) were readily believed; a fact which is illustrated by the name of the first kind of bird of paradise which was described by science. It was called *apoda*, the footless bird, the bird without legs. So glorious was the color, texture, and harmony of the plumage, that the stories of the native hunters that the birds never alighted on earth or tree, but always flew with feathers extended to the sun, was not only credited, but formed a basis for the name which they bear to this day.

The following passage is taken from "The Malay Archipelago." Wallace, whose acquaintance, with these wonderful birds in life is more intimate than that of any other naturalist, says:—

"When the earliest European voyagers reached the Moluccas in search of cloves and nutmegs, which were then rare and precious spices, they were presented with the dried skins of birds so strange and beautiful as to excite the admiration even of those wealth-seeking rovers. The Malay traders gave them the

name of *Manuk dewata*, or God's birds ; and the Portuguese, finding they had no feet or wings, and not being able to learn anything authentic about them, called them *Passaros de Sol*, or birds of the sun ; while the learned Dutchmen, who wrote in Latin, called them *Avis paradiseus*, or paradise bird. John van Linschoten gives these names in 1598, and tells us that no one has seen these birds alive, for they live in the air, always turning toward the sun, and never lighting on the earth till they die ; for they have neither feet nor wings, as, he adds, may be seen by the birds carried to India, and sometimes to Holland ; but being very costly they were then rarely seen in Europe. More than a hundred years later Mr. William Funnel, who accompanied Dampier, and wrote an account of the voyage, saw specimens at Amboyna, and was told that they came to Banda to eat nutmegs, which intoxicated them and made them fall down senseless, and they were killed by ants. Down to 1760, when Linnæus named the largest species *Paradisea apoda* (the footless Paradise bird), no perfect specimen had been seen in Europe, and absolutely nothing was known about them."

It does not seem too late, even at this date, to repair some of the damage, and much wise legislation has been enacted to that end. Another factor is, however, more essential, public opinion ; the cultivation of the sensibilities, the discouragement of taking life of any kind needlessly, the establishment of friendship between man and beast. The consummation of civilization in this direction, and the knowledge that much greater æsthetic satisfaction is to be derived from that which is alive rather than from that which is dead, is the result to be worked for.

Returning from my trip to the South I visited at the mouth of Tampa Bay an enormous breeding ground of Cabot's terns, and continued my way homeward, reaching Tarpon Springs early in July. Throughout the summer I collected birds of the region, and made careful records of all observations regarding the summer bird fauna of the locality. Practically this sort of work was continued throughout the year, and until the following June, that of 1887, when I left Florida for a brief period, spending some three months in the North.

Several matters that came under my notice during this time seem worthy of record. On the 7th of February, 1887, from a nest in a rookery not far from the town, I took three young of Ward's heron, the prototype of the great blue heron of the North, and similar to that bird in general appearance, though somewhat larger. These young birds were about three weeks old, and were passing from the downy to the feathered state of plumage. My purpose was, to watch their growth, especially the development of the feathers. I put the fledgling herons under a rude cover in the yard inside of a low fence which they could not climb over, and fed them fresh fish cut into pieces. They also had a supply of water. In the space of a week or ten days, they were fully able to care for themselves, and it was only

necessary to place the dishes containing food before them, when they would gulp it down in large mouthfuls, and then, standing on one or both legs, go to sleep. They grew very rapidly, and became extremely tame, seeming only to have antagonism to the dogs about the yard; for by this time the herons were no longer confined to their small coop, but roamed at large. So matters went on until they attained their full growth. Then, the purpose for which I had reared them having been accomplished, so far as the changes in feathers were concerned, I concluded, as they were a source of danger to the dogs, to take them back to the cypress swamp, the site of the rookery, thinking they would be best satisfied to be left in their native haunts.

With this end in view I called in the services of one Brown, a colored man, who had been with me when the birds were captured. They were now placed in a rude coop and transferred to the wagon. We then drove to the cypress swamp some three miles from the town. It was late in the afternoon when we started, and by the time we arrived at our destination it was quite dark, late in the dusk of the evening; so we quickly liberated the captives, and returned.

Imagine my surprise the next morning, on coming out of the house, to see the three herons perched in a row on the fence, announcing with loud voices

and gaping mouths that it was high time for some one to go to the fish market. Needless to say, I went at once. Nor was this the end. I found I could not get rid of them. Like Sinbad the sailor, I had taken up a load, and could not lay it down ; the Old Man of the Sea would not relinquish the advantage he had gained. After various experiments and expedients, an arrangement was contrived that seemed fair to all parties. There was a boat-house on the bayou that had a grated water door through which the tide rose and fell, and inside was a spacious pool for the accommodation of various craft. Now, this was not in use ; and here, for a time, two or three weeks, the birds were confined. They were supplied daily with food, and were able to catch many small fry that swam about in the enclosure, eking out a good living. After a time the water-gate was left open, when they all waded out, and flew to various points in the bayou. From that time on for months the herons were daily seen walking about, and at any time when I had a fish, I could call them and they would come and get it. With the arrival of sportsmen from the North, one by one these birds were sacrificed to satisfy the killing instinct that seemed to be rampant in the breast of every man who invaded Tarpon. The last one disappeared about fourteen or fifteen months after liberation.

Fortunately, these occurrences answered a good purpose. The town authorities of course had noticed these birds, and I had frequently warned people not to kill them; but this lesson was better than all preaching. Now a law was made that, within a certain distance of the town, and on the adjacent waters, no one should be allowed to fire a gun. As a consequence, during many ensuing winters many kinds of birds frequented these waters; wild ducks swam about in the bayou which reached away into the town, and became so tame as to approach within a few feet and pick up pieces of bread thrown to them, much as swans and ducks down on the ponds in Central Park. They soon found out that here they would be unmolested.

Nor was this the only place where similar results followed protective steps. There is a hotel on Tampa Bay located at the end of a long railway wharf which extends several miles out from the shore. Here passengers embarking and arriving on the steamer for Key West are entertained. The dining-room windows did not simply look out upon the water, but were over it, the walls of the house rising on piles straight from the bay. While taking breakfast one morning in March, the windows all open, I was surprised to see countless wild ducks, chiefly the lesser scaup, swimming about close to the building, much at home. On

throwing out a bit of bread, they scrambled for it and tussled with one another, much as tame ducks do. Then, as soon as other ducks at a little distance perceived that feeding was going on, they joined the troop, and before long several hundred wild ducks were under the windows of this hotel, affording an unusual sight.

The waiter, noticing my interest, informed me that this result had been brought about because, in order to prevent accidents to guests, one of the rules of the establishment was that no firearms should be discharged in the vicinity, from any point on the wharf, or on the adjacent waters. Not the least curious part of this incident is that the same kinds of ducks, only a little distance away in the bay, say a mile, were so extremely wild, that it was difficult to approach them. I believe that probably some of the individuals observed as so wary, were the very birds that, when in the vicinity of the building, lost all sense of fear. I am inclined to believe that they discriminated that danger ensued from the approach of men in boats, and that in the vicinity of the inn nothing was to be feared.

During the same spring when the Ward's herons were obtained, I also procured a brood of four young sparrow-hawks, from a deserted wood-pecker's hole in a palmetto. The birds were just beginning to feather. They were kept under

similar conditions to the herons, but were fed on raw meat, and thrrove well. While confined at first in an ordinary mocking-bird's cage, to prevent enemies from getting at them, as soon as they had grown wings and were able to fly about, they were allowed full liberty. For upward of a year three of them remained in the vicinity of my house, and might be seen perched on one of the chimneys during a part of the day. At such times, if any one approached them with a piece of meat, and whistled, they would immediately fly down, and take it from the hand; and for a long period, while they were young, that is, until they were five months old, they all stayed about the house; when any one appeared, stranger or friend, they were vociferous in their calls to be fed. The sharp "peep, peep, peep, peep," of their whistling was a sure indication in the house that some one was coming. During our absence one summer, these hawks disappeared, and I fancy that this came about because there was no one to feed them, and hence they naturally resorted entirely to the methods of wild birds.

Another incident of the year 1887 was the discovery, in the vicinity of Tarpon Springs, on the 17th of March, of a nest of the ivory-billed woodpecker. I feel that the great pioneer of American ornithology has so fully painted the portrait of this noble woodpecker that I may

better borrow from him than attempt a new description.

"I have always imagined, that in the plumage of the beautiful ivory-billed woodpecker there is something very closely allied to the style of the great Vandyke. The broad extent of its dark, glossy body and tail, the large and well-defined white markings of the wings, neck, and bill, relieved by the rich carmine of the pendent crest of the male, and the brilliant yellow of its eye, have never failed to remind me of some of the boldest and noblest productions of that inimitable artist's pencil. So strangely indeed have these thoughts become in-grafted in my mind, as I have gradually obtained a more intimate acquaintance with the ivory-billed woodpecker, that whenever I have observed one of these birds flying from one tree to another, I have mentally exclaimed, 'There goes a Vandyke !'

"I wish, kind reader, it were in my power to present to your mind's eye the favorite resort of the ivory-billed woodpecker. Would that I could describe the extent of those deep morasses, overshadowed by millions of gigantic dark cypresses, spreading their sturdy, moss-covered branches as if to admonish intruding man to pause and reflect on the many difficulties which he must encounter, should he persist in venturing farther into their inaccessible recesses, extending for miles before him, where he should be interrupted by huge projecting branches, here and there the massy trunk of a fallen and decaying tree, and thousands of creeping and twining plants of innumerable species ! Would that I could represent to you the dangerous nature of the ground, its oozing, spongy, and miry disposition, although covered with a beautiful, but treacherous carpeting, composed of the richest mosses, flags, and waterlilies, no sooner receiving the pressure of the foot than it yields and endangers the very life of the adventurer, whilst here and there, as he approaches an opening, that proves merely a lake of black, muddy water,

his ear is assailed by the dismal croaking of innumerable frogs, the hissing of serpents, or the bellowing of alligators! Would that I could give you an idea of the sultry pestiferous atmosphere that nearly suffocates the intruder during the meridian heat of our dogdays, in those gloomy and horrible swamps! But the attempt to picture these scenes would be vain. Nothing short of ocular demonstration can express any adequate idea of them."

Audubon found the ivory-bill breeding, and became intimately acquainted with its home and young. Few ornithologists of to-day have been so fortunate. From my notes made at the time, I copy as follows:—

"To-day I found a nest of ivory-billed woodpeckers, and obtained both parent birds and the single young which was the occupant of the nest. The cavity for the nest was excavated in a large cypress tree in the midst of a dense and sombre swamp, the entrance to the nest being forty-one feet from the level of the ground. The opening to the cavity was oval in shape, about three and a half inches wide and four and a half inches high. It seemed apparent that the same cavity had been used before for a nesting place. It was cylindrical, and rather more than fourteen inches deep. The young bird in the nest was a female, and though about one-third grown, was as yet only slightly feathered, and had not opened its eyes. The feathers of the first plumage were apparent, beginning to cover the down, and were exactly the same in coloration as those of the adult female bird." — MSS. NOTES.

So far as I am aware, this is the only recent record of the finding of the nest of this bird, and one of the few records that we have in regard to

very young birds. The ivory-bill woodpecker was formerly common in the South, but is now rare and very shy. However, I once saw, during this same winter, eleven at once working on some dead cypress trees. Four were together on the same tree.

I now purpose to dwell at some length on a protracted expedition made during the spring of 1890. On this occasion I sailed south along the Gulf Coast, going over the ground formerly traversed, and, extending the journey beyond Punta Rassa, finally rounded Cape Sable, and went far to the northeast of it. Thence crossing to the Florida reef, I cruised among the Keys, ultimately reaching Key West. At this point, through the kindness of my friend the late Major Charles E. Bendire, U.S.A., and the courtesy of the Treasury Department, the Government Revenue Cutter *McLane* was placed at my disposal. Permission was granted me to visit the group of islands known as the Dry Tortugas, and to remain there as long as might be essential to the end I had in view. I shall not dwell at length on the events of this expedition, which I have set forth fully in several papers, the titles of which are cited in the bibliography.

Audubon has made the region in the vicinity of the Florida reef historical in ornithology by his explorations, and on this expedition much of

this classic ground was traversed. Here was the home of the great white heron, a bird that for a while was lost, like a number of other of Audubon's discoveries. That is, for many years no other specimens than those which he brought back with him were obtained. Here, too, he saw and described vast flocks of flamingoes, and, so far as I am aware, no naturalist had seen this great flock of flamingoes since Audubon's day. It is true that local hunters, especially those in pursuit of plumes, had reported the great flock about to be described; but the reader can imagine something of my sensations on seeing for the first time probably more than a thousand of these remarkable birds in one great band.

Eighteen miles east of Cape Sable three bays make into the mainland. The water in these bays and for miles outside of them is extremely shallow, being rarely more than a foot deep, while at ordinary tides the depth does not exceed six inches. The bottom is muddy, the mud is unfathomable and of the consistency of gruel, making wading impossible and poling a boat difficult. The shores are wooded with black mangrove, "buttonwood," and cabbage palmetto, beside some undergrowth of small shrubs. The land is so low as to be flooded at spring tides. It is therefore necessarily very damp, and is the home of vast hordes of mosquitoes, which flourish

in all their varieties. Even in February, when I visited this spot, though a stiff easterly breeze was blowing all the time, going ashore was something to be dreaded, and once upon the land the conditions were well nigh unbearable. There was no fresh water to be obtained for miles, the nearest being on the other side of Cape Sable, that is, to the west of it. It was a most desolate and forbidding country, either on the sea, if this shallow water might be termed sea, or on land, if these damp mangrove swamps with their muddy bottoms could be so designated. But it was possible to make a headquarters upon the schooner in which I was cruising, some ten miles from the mouth of the first of these bays.

After a long search, being well nigh discouraged, and having at last found the flock, I determined to remain for a time to observe the flamingoes. Rounding the point of the first or more westerly of the three bays, it was found to be a mile and a half in width, and it extended two miles into the land, with a decided bend or curve to the westward. No birds were observed until the extreme end of the bay was opened, and there, perhaps a mile away, was presented a novel and wonderful sight. Stretching out for fully three-quarters of a mile and about three hundred yards from the mainland shore was a band of rosy, firelike color. This band was unbroken, and

seemed to be even, though curving with the contour of the shore. Now and again a flame or series of flames shot up above the level of the line, which was caused, as seen through a glass, by one or more birds raising their heads on their long, slim necks to rest themselves or to look about. When first noticed, most of the birds were feeding with their heads low down or below the surface, searching in the mud for minute shell-fish, which appeared to be their favorite food. Now some of the birds saw the boat, and the alarm was given. Slowly and gracefully the line began to contract toward the centre, and the band soon became a great red patch of fire on the water, the resemblance to flame being much increased by the constant movements of the heads and necks of the multitude. In a few moments the birds began to rise, and all were soon in flight, passing out of the bay and over the point of land to the east in long lines and in V-shaped parties, recalling similar processions of wild geese.

The color of the flamingoes when alighted was striking, but when in the air the birds seemed unreal. They were like a cloud of pink, flame-colored and brilliant with the hues of sunset, shot with quivering tongues of fire. As far as one could see the retreating flock color was the conspicuous feature. Everything else was for the moment forgotten.

After waiting a long time for the return of the birds, and exploring neighboring bays without discovering more, I returned to the schooner; but the next morning was off bright and early, and on reaching the first bay the large flock was again found feeding. Instead of approaching by boat this time, I landed and toiled in spite of the mosquitoes to a point of vantage, perhaps some three hundred yards from the birds, where I could readily examine them, both with the naked eye and by the aid of a glass.

While feeding, they were stretched out in a long line, generally in a single rank, but sometimes in two platoons. The line varied in length at times; now it extended for a mile, and again it contracted to some six hundred feet. When stretched to its extreme length, it was broken in places, intervals of a hundred feet being the longest open spaces.

During the time the birds were feeding, there were three small parties, varying from two to five individuals, that were evidently doing picket-duty. At each end of the line, about a hundred yards from it, was posted one of these parties, and offshore, about the centre, a third outpost was stationed a hundred feet away. At intervals of half an hour, or perhaps a little longer, individuals composing these picket-squads would take wing, fly to the flock, and alight, and in less than a

minute some other birds would take the places of the retired sentinels. The entire party of sentinels was not changed at one time; one would retire and another take the vacant place. There were never more than five individuals in a picket party, and now and then I noticed a solitary sentinel, and the squad at times consisted of three birds. These outposts did not feed, and seemed to spend their time in watching and giving attention to the protection of the main body.

Besides the bright scarlet birds (which were comparatively few) there were many individuals less brilliant; I should describe them as a rosy salmon, and some of the flock were a dull, grayish white in color. These three phases represented varying ages of the flamingoes, the dull gray birds being immature and the scarlet ones adults.

In this remote region, beside the flamingoes, there were many other interesting birds. Large flocks of white pelicans, and a great many Caspian terns were present. The great white heron, which is a solitary bird, and not at all like in character to its gregarious smaller allies, the two white egrets, relieved the deep green of the mangrove that covered the shore, seeming like marble statues, and decidedly Japanese in effect. Nor were the smaller birds absent. Many kinds of warblers, great Carolina wrens, kingfishers, sparrow-hawks, flickers, catbirds, and fish-crows

abounded. Overhead soared both kinds of buzzards common to the region, and bald eagles might frequently be seen perched or flying.

From the point where the flamingoes were observed, I crossed to Bahia Honda on the Florida reef, and thence turning again westward, sailed about among the various Keys in a leisurely manner, examining the birds and their breeding grounds, and ultimately reached Key West. Novelties that presented themselves on the way were the Mangrove cuckoo, the Key West vireo, and the black-whiskered vireo. On many of the low mangrove islands colonies of yellow-crowned night-herons were breeding, and throughout the journey I not only frequently saw the great white heron, a truly regal bird, but found it nesting, and obtained both its eggs and young.

At Key West I remained nearly three weeks, during which time daily excursions were made to procure representative birds and to obtain additional notes in regard to the migration, and comparative abundance of the several kinds.

I will now give some account of a visit to the Dry Tortugas, and the results that accrued from it, and then briefly summarize the general features, and more striking achievements of the several seasons that were passed on the Gulf Coast of Florida.

The group of islands known as the Dry Tor-

tugas have become famous since the time of my visit, in connection with the late Spanish war; and it is not my purpose to speak of present conditions, but rather to record such as existed twelve years ago. The Dry Tortugas are a group of irregular, low, sandy and coral islands, six in number, which are some sixty miles west of Key West in north latitude $24^{\circ} 35'$ and west longitude $82^{\circ} 52'$ approximately. The only land between Key West and Tortugas is a group of Keys known as Marquesas. These Keys are within twenty miles of Key West, so that the little specks of land which we call the Dry Tortugas rise from the Gulf of Mexico in an isolated position; the nearest island being forty miles distant. The mainland of Florida is a hundred and forty miles away, while the Island of Cuba is not quite ninety miles to the south. The coast of Yucatan is three hundred and fifty miles south-west, and, directly westward, the Mexican coast is seven hundred miles distant. I speak of all this so that to the reader it may be really apparent how isolated these islands are.

The most important island of the group, though by no means the largest, is known as Garden Key. It is nearly circular, and when it was my headquarters its shores were defined by the ramparts of Fort Jefferson, an obsolete brick fortification, three tiers in height. In the enclos-

ure formed by the ramparts, an area of some ten acres, are barracks and officers' quarters. In one part there was a very considerable grove of buttonwood trees, perhaps half an acre in extent, and scattered about were some forty cocoanut palms, as well as single buttonwood trees of fairly good size, but not more than fifty feet high. None of these trees extend above the high walls of the fort, which rise fully sixty feet above the surface of the water.

Three-quarters of a mile to the west of Garden Key is a small Key, oval in shape, containing about eight acres, which is known as Bird Key. Here myriads of terns come annually to breed, nesting both on the ground and in the low stunted bushes that shade it. I was not so fortunate as to see the terns nesting, nor were they present during my stay; but my friend, Dr. Goodman, who was stationed here in those days, and who undertook subsequent investigations for me, told me that shortly after I left the birds arrived in great numbers. The noddies and sooty terns arrive at the Dry Tortugas about April 20, but at first remain only a few days and then disappear, to return some days later in greatly increased numbers, when breeding is almost immediately commenced. They leave early in the fall, and are not seen here, except an occasional one, until the following season. Since the Span-

ish War the Government has carefully protected the nesting grounds of terns, as well as of the boobies, which breed in the vicinity on another Key. Formerly the egg hunters preyed on all at will, supplying annually eggs by the barrel to the Key West market.

I cannot dwell on the details of the bird life that characterized these keys, except in a general way; the eighty different kinds of birds, represented by thousands of individuals, which I saw during my stay of three weeks, are fully dealt with in a paper indicated in the accompanying bibliography. I had come to the Dry Tortugas with the idea that I would see and become acquainted with water-birds that were new to me; but fifty-seven kinds met with were land-birds, a marked preponderance. Therefore it is mainly regarding *passeres* that my contributions from these remote islands are of value. The conclusions I arrived at from watching the migration were that the birds of the Florida peninsula, which have become specialized so as to present tangible characteristics in appearance, are not migratory in a large sense, but are restricted to comparatively limited areas which they do not leave. For instance, the white-eyed vireo is a migrant bird in the eastern United States, passing southward to the island of Cuba, and even farther south in the winter, and the white-eyed vireo was a common

migrant at the Dry Tortugas. Now the representative of the white-eyed vireo which resides in southern Florida, and which has become so specialized in appearance as to receive an appellation of its own, the Key West vireo, was not observed at the Dry Tortugas. Similarly, the Maryland yellow-throat, which is a common migrant on the eastern coast of North America, was observed continually during my stay; while its near ally, the Florida yellow-throat, characteristic of the Gulf Coast of Florida, and which breeds there, was not present, and has never been observed away from Florida. The generalization to be made from these observations is that these specialized forms have developed from closely allied kinds, largely as they have acquired non-migratory habits.

During the interval which had elapsed since my return to Florida in 1886, concluding with my work in the year 1890, I had collected much material; four months which were spent in the mountains of Virginia and North Carolina had added to this.

An undescribed species of marsh-wren, a new sub-species of the white-bellied nuthatch, and the determination of the wild turkey of Florida as a sub-species, were parts of the contribution. In view of the fact that I have not seen in collections, nor found in any locality where I have

studied, Georgia, north Florida, or the Carolinas, intermediates in color and markings grading into the other forms of wild turkey, or white-bellied nuthatch, I now regard both these birds, not as sub-species, but as well marked, specific forms.

Also during this time I sent to my friend, Mr. J. A. Allen of New York, a seaside sparrow, from the salt-water marshes of Florida, knowing it to be a new race. In the same way I placed a series of a new kind of rail with the late George B. Sennett, Esq., who was then writing a monograph on the salt water rails of North America. I was fully aware in sending him the bird that it was undescribed, and he did me the honor to name it after me. To Mr. Frank M. Chapman of the American Museum of Natural History I forwarded a series of the prototype of the Maryland yellow-throat as it exists in Florida, which I felt sure indicated at least sub-specific distinction. In this matter Mr. Chapman agreed with me, and duly described the new birds; so that during this period I had found in a country where naturalists had been working for many years, six undescribed forms of bird life. Nor was there effort on my part in this direction. These were episodes in the routine of work that was being carried on.

In a manner satisfactory to ornithologists, I established the specific identity of two supposed different forms known respectively as the short-

tailed and little black hawks. These birds had been long known; but it remained to find them breeding, and to deduce from observation the generalization that the difference in appearance which had led naturalists to consider them specifically distinct was either a color-phase, correlating with sex, or, what is more probable, a double color-phase, such as exists in the common screech-owl, numerous birds of prey, as well as in some of the herons. At the Dry Tortugas, where my contributions were chiefly concerning land-birds, I observed two kinds of swallows, the Cuban cliff swallow and the Bahaman swallow, which had never before been recorded from North America. During all this period contributions were constantly made to technical ornithological magazines recording the results of work as it was accomplished; the titles of these papers form part of the bibliographic list appended to this book.

I wish it were in my power to express in concluding this chapter my appreciation of the beauty and variety of landscape in Florida, and to dwell more fully upon the never-failing source of delight afforded by its many waterways and the noble Gulf which bounds its western shores. The vast hammocks, with their imposing live-oak trees festooned with Spanish moss, where great magnolia trees shade under their overhanging limbs

groves of wild oranges, and where the variety of plant life seems most luxuriant; the cypress swamps, gloomy and funereal in appearance, which are the homes of the ivory-billed wood-pecker, the swallow-tailed kite, and the resorts of deer and bear; the great prairies of southern Florida dotted with islands of palmetto and pine, are some of the regions that indicate the variety presented to the traveller. But the salient characteristic of Florida is the endless pine forest that practically covers the entire State. By many people these woods and forests are regarded as extremely monotonous, tiresome, and in no way pleasing. For my own part, I have never ceased to wonder at their beauty. In no two regions of Florida do they present exactly the same character. The variety in form is endless; an ever changing picture is revealed, heightened by the interspersal of a varied undergrowth, palmetto, oak, and bay, and by the local light and color. These forests appealed to me for many years; and for a long time I felt alone in caring for them, until at an exhibition of some of the work of the late George Inness I saw these very woods again in all their beauty. Of the waterways much has been said, and little can be added. They must be seen to be appreciated, and lived upon to be enjoyed. It is even so with the Mighty Gulf!

CHAPTER XI

FLORIDA PRAIRIES AND VIRGINIA MOUNTAINS

THE land of pine forest and cypress swamp, of lakes and everglades, of seashore and river, seems to offer in these prodigal diversity. It needs only mountains and great plains to round out the variety of physiographic conditions. There are no mountains; but the plain region of Florida is not only well marked, but is extensive. These plains are situated in south Florida northwest of Lake Okeechobee. The Kissimmee River, in its lower stretches, runs through their eastern border, and the upper waters of the Caloosahatchee bound their limits to the south. The "Big Prairie," which I visited in April, 1892, reaches from the "hammock" that fringes the northern bank of the Caloosa River, north to Fort Ogden, a distance of forty miles. It is at its widest point thirty miles broad and its narrowest breadth is upward of twenty miles. This plain is without undulation, and is very even as to surface. During the rainy season slight depressions become ponds or lakes of varying extent, and at times

of unusual precipitation nearly the entire area is submerged, suggesting the probability that this was once the floor of a sheet of water similar to Lake Okeechobee.

Coarse wiry grasses, a growth of dwarf huckleberry, and scrubby clumps of saw palmetto are the characteristic forms of plant life. Now and again at long intervals the monotony of the scene is varied. Isolated patches of pine forest of a few acres, and small "bayheads" of deciduous trees, appear above the level, like miniature islands in a lake. The conditions that obtain are not unlike parts of the prairies in Texas, and a similar, arid, desolate appearance distinguishes both. Making a camp in the hammock near the river, for a week in April, daily trips were undertaken, to learn something of the bird life that characterized this prairie.

Birds there were in abundance and variety. Wild turkeys, pileated woodpeckers, sandhill cranes, ducks, and herons abounded; besides throngs of many kinds of small birds were everywhere. While these presented groups of sufficient interest, they were not what I sought to study in visiting this remote place.

One of the birds of the plains characteristic of the plains was prominent; the burrowing owl was plentiful, and generally distributed. This last condition precludes one of the salient habits of these

owls in the "prairie-dog towns"—gregariousness; for there are no prairie-dogs on these prairies, and the little owls are forced to make their own burrows, which are widely scattered. My stay was coincident with the height of the breeding season. The burrows, excavated as dwelling places, were also used for breeding, and at the mouth of each domicile was a little hillock of sand, the proprietor or joint owners often standing on this elevated porch to view the surroundings. Visitors were greeted by them with the same bowings, nods, and antics that are marked traits of their Western cousins. Too close an approach, though the birds were not timid or wary, often caused them, instead of flying, suddenly to disappear into the burrow. These excavations, several of which were explored, were generally about eight feet in length and some seven inches in diameter. They rarely penetrated more than eighteen inches below the surface, when they turned at an easy curve and were extended parallel to the top of the ground. The site for such a residence was more frequently in or near a clump of the dwarf, stunted huckleberry growth. At the end the burrow was enlarged into a chamber, and here the round white eggs, from four to seven in number, were laid. There was but little attempt at nest making. Usually the eggs lay on a thin bed of cow-dung, dry trash, and a few feathers. This sort of

material littered the floor of the burrow throughout. Rattlesnakes were plentiful on this prairie, but no communal relations with the owls had been established.

The other notable bird of the region was the caracara eagle. It was conspicuous on account of its party-colored plumage, and its peculiar flight and strident, cackling cry at once arrested attention. I found three nests of this eagle containing young almost ready to fly. Two nests were in cabbage palmettos and one in a pine. They were all about twenty feet from the ground. The caracaras were not shy, and were as great nuisances about camp as the Canada jay is in the North. Their size allowed the pilfering of objects of some weight; a duck or rabbit being readily carried off.

I have gone into the history of these two birds for the reason that here is a comparatively small isolated prairie presenting conditions similar to regions in Texas. The nearest point in Texas is seven hundred miles away. In the intervening region there are no burrowing owls and no caracara eagles; but both of these birds are characteristic of the arid plains of Texas. There are some miniature prairies on the larger islands of the Bahama group. Here again the burrowing owl is characteristic. Throughout the great pampas and arid dry stretches of South America, away

to Patagonia, conditions prevail similar to those of the prairies of North America, and burrowing owls and caracaras flourish. A specialized territory cropping out at far distant points on the same hemisphere is accompanied with certain specialized birds found nowhere else, but which are common to all such regions.

The warmer portion of the year in Florida is enervating, and it was an advantage, from a working point of view, to have a climatic change. One excursion to a cooler and more bracing climate was to the elevated region in the southwestern part of Virginia. Here the peaks of the Blue Ridge attain a height of more than four thousand feet. On almost the summit of one of these (to be exact, forty-one hundred feet above sea level) is an oval lake a mile long and a third of a mile across at its broadest part. A fringe of laurel reaches to the edge of the water, often overhanging it. This changes insensibly into a dense growth of luxuriant rhododendron, which, in its turn, fades into a sombre hemlock forest. At evening on a June day the color reflected from this frame in the placid waters is alone worth a long journey to look upon. The laurel and rhododendron, always beautiful, are at their best when in flower, and the mass of bloom and depth of color seem to culminate here; for in the mirror all are duplicated and one sees four instead

of two bands of gorgeous tints and hues wreathing the shores.

In the woods, a little earlier in the season, azalias of the flame-colored variety blossom in profusion, and throughout the summer a prolific succession of many-hued wild flowers delight the sojourner.

The songs of the veery and solitary vireo ring through the hemlocks, snowbird's nests are more common than chipping-sparrows by the roadsides, while red-breasted nuthatches rear their young on the edge of every clearing. Yellow-bellied sapsuckers are the commonest breeding woodpeckers, and olive-sided flycatchers are not rare. The Canada fly-catching warbler is almost as frequently met with as the snowbird, and together with the Blackburnian, the black-throated blue and the black-throated green warblers, form a group whose members are conspicuous during the breeding season. Ravens and pileated woodpeckers are to be seen daily, and the voice of the turkey has not been silenced. Bird life is not only varied, for only the most notable kinds have been indicated, it is redundant.

But you began to talk of Virginia, the land of the redbird and mocker! Of the magnolia and persimmon! Yes, but this is an island. Not an island in the water, but in the air. For at high altitudes the conditions of more northern low-

lands prevail, and it is the climate, fauna, and flora of Maine or New Hampshire that distinguishes the summit of the Blue Ridge at the point under discussion. Not every feature is present, and some details are added, but considered from a large point of view no other conclusion can be drawn. This is an Alpine island, possessing sufficiently definite characters to warrant its inclusion in the Canadian faunal zone.

And the same is true in regard to elevation at any point. It need only attain to sufficient height, and the conditions that prevail there (average temperature and precipitation are perhaps chief among them) produce a fauna and flora similar to that found in adjacent land areas to the north and at sea level. One has only to look at a high peak with its perpetual cap of ice and snow to see an arctic island, and on its slopes will be found the parallel of a journey to the arctic zone.

Mountain Lake, in Giles County, Virginia, is the "Canadian Island" I have pictured. There are similar regions extending down into the Carolinas and almost overlooking Florida from Georgia.

CHAPTER XII

XAYMACA: THE ISLAND OF MANY RIVERS

"THE privileges of the white man in Hayti are not numerous, but exemplary conduct on his part always enables him to overcome the social disadvantages attaching to his unfortunate color." This epigrammatic sentence, embodying the spirit of the Haytian Constitution, we heard from a fellow-passenger on the staunch British steamship *Alene* of the Atlas Line, commanded by a thorough-going Yankee sea-captain, which conveyed our party to Jamaica, West Indies, in the autumn of 1890.

We laughed heartily over the reversal of the white man's position in the Black Republic set forth by Mr. W—, and half believed it a traveler's tale. Our own amusing, annoying, not to say humiliating, experiences later on in an island whose black population is six hundred thousand and whose resident whites number less than fifteen thousand, made the story quite credible. We came to understand how a black man may feel in a white man's country. But we had no misgivings during the voyage, every moment was

a delight. The cold November weather gave way as we sailed southward. The gray sky, the grayer sea with its cross waves and huge rollers, were soon left behind; we entered the region of enchantment,—deep blue sky above, deep blue ocean below; flying fishes, tropic birds, petrels, and boobies, adding life to the scene.

On November 12 we sighted San Salvador, the landfall of Columbus. On the 14th the mountains of Hayti were plainly visible. As darkness came on we saw the Southern Cross for the first time, and on the morning of the 15th entered the harbor of Kingston. The previous night had been one of sleeplessness and discomfort, spent in vainly attempting to adjust the wind-sail in our port to the shifting courses of the ship, as we cruised about just outside the harbor, it being too late to enter, because of the dangerous reefs.

Waking from a brief nap at the gray of dawn, the outlines of the mountains loomed up boldly through the dim light, Blue Mountain Peak lifting its superb height seven thousand feet and more above us. The first rays of the sun lighted peaks and cañons, throwing them into boldest relief. The mountains in contour and coloring called to mind at once those of the familiar Santa Catalina's. The beautiful bay stretched away to the city six miles distant, the long low line of Port Royal fringed with cocoanut palms forming its

eastern boundary. On the land green deepened to black and purple in the shadows of the mountains, in the bay opaline hues darkened in the depths of the water.

We reached Kingston wharf at eight o'clock, greeted by a noisy, demonstrative crowd, grading in color from *café au lait* to ebony, and speaking a gibberish all unknown to us, English though it was. My letters of introduction to the governor and other prominent officials saved me much annoyance in getting through the customs. My scientific equipment was admitted free of duty.

No sooner had we left the ship than a line of black cabbies assailed us, importunate, vociferous, and as bare-faced in their demands as those of our native land. Resisting all their efforts at extortion, we finally made a fair bargain, and got off in a two-seated trap drawn by a poor little rack-a-bones of a horse. We found ourselves at once in a tropical town. The narrow streets were crowded with shops on either side, wares of all kinds displayed in heterogeneous confusion,—dried fish, heaps of strange fruits, gay-colored stuffs, rum, whiskey, strings of dried peppers, with an occasional establishment devoted exclusively to dry goods or hardware. More than occasional were the exclusive rumshops. Leaving the business streets behind we came to the region of houses,—small cottages built close to the street, villas behind

high walls of concrete, all of dazzling whiteness, draped with creepers, overhung with masses of vivid poinsettia, tall palm trees lifting their stately heads in the background.

The procession of peasants coming to market began to pass us, for it was Saturday, singly and in groups of three or four, the women bearing heavy burdens on their heads. The diminutive donkeys which they drove carried panniers heaped with yams, sweet potatoes, charcoal, grass, and sugar-cane, and now and again groaned under the weight of a lazy master. Short skirts, caught up with a curious hitch suggesting a reversed bustle, loose jackets, bare legs and feet, turbans of brilliant colors, rags and tatters, characterize the drivers as they trot rapidly past with merry smile and a quaint courtesy in return for our greetings. The occasional men of the party meanwhile trudge stolidly along, passing us unnoticed, their only burden a machete carried in the hand or on the head.

And so it continued, this never ending procession, till we reached the gates of Constant Spring Hotel, six miles distant from the city. Thus far we had seen few birds, save the "John Crows," turkey-buzzards circling just above the house-tops, and tick birds (anis) walking on the grass by the roadside. The ani is a slim bird, with a body a little larger than that of a cow-bird, and a long tail. The color is black, and the glossy feathers are

lanceolate in shape with iridescent metallic sheen, steel-blue, purple, and green, of varying intensity. The bill, however, is the distinguishing feature. It is compressed laterally, and resembles the blade of an ink eraser, being about the same size, proportion, and of similar contour. Anis are gregarious, but do not assemble in large flocks. Rarely are more than six or eight found in company, and a solitary individual is exceptional. Nor do the birds pair in the ordinary sense at mating time. Many work together in the construction of a large communistic nest, where all the females of the company lay their eggs. Twenty-one eggs have been taken from a single nest, but the number is not generally so large. The site is frequently in a bunch of mistletoe, always well up in the tree.

Anis, while not exclusively insectivorous, are almost wholly so. Larvæ and grubs, in the droppings of cattle and in the ground, are eagerly sought. But it is as an enemy of the grass-tick that the bird is noted. These minute parasites, whether among the blades of grass or in the hair of cattle, are hunted with avidity. Numbers of the birds may often be seen carefully searching through the hair of some patient cow or ox in repose, and a band of grazing animals is always attended by a party of these industrious hunters. They walk about on the bodies of their bovine

friends as freely as on the ground, with a deliberation that indicates perfect freedom from fear. The ani is a member of the cuckoo family, and is among the more characteristic of the West Indian birds. It is not a little curious that in certain of its traits the cow-bird closely resembles the ani, and the cow-bird's habit of laying eggs in other birds' nests is found in another representative of the cuckoo group.

Comfortable quarters awaited us at the English-American inn, established this winter with expectation of extended patronage; for the much-heralded West Indian Exposition was to open the first of February. We had no desire to linger in this tourist-ridden spot, but began within a day or two to seek a suburban place where my work could be carried on without interruption. Before starting on our quest I called at King's House, presented my letter of introduction to Sir Henry Blake, the governor, received from him a cordial welcome, and the official sanction to carry on my investigation of the bird life of the island. Lady Blake took us through the beautiful gardens, pointed out the many rare and strange plants, and showed us her interesting drawings and paintings of the bats of Jamaica, of which she has made a careful study.

Our American consul, Mr. ——, interested himself in our behalf, and furnished us with a list of

the various "pens" in the neighborhood "to be let." A "pen" in Jamaica means a country place of more or less acreage. "Nightingale Grove" had attractions. The grounds were ample, the house of the prevailing type, two storied, with broad, spreading roof and jalousied verandas, answered our needs very well; but the "brown lady" was only willing to take us as lodgers. "The Retreat" was charmingly located about a half-mile from the hotel, embowered in the shade of the great silk-cotton trees, with bananas, bread-fruit, palms, and fantastic creepers offering ideal cover for birds. But here madam was obdurate; we could have three bedrooms and "the run of the drawing-room" for £10 sterling a month, but she could not consent to give up the entire house to us; and this notwithstanding the place was advertised for rent.

We soon learned that it was almost impossible to make any bargain with the average Jamaican, who is wholly unwilling to be held by his own terms. Exhausting the lists of near-by places, and finding none available, we drove one afternoon to Stony Hill.

Groves of bananas, beds of ferns, carpets of lycopodium, clusters of orchids, are the foreground of the wooded hills through which winds the road. Built in the far-away days of slave labor, it is still a model of excellence, firm, and of

easy grade. A thousand feet up is the reformatory, at the top of the first ridge, overlooking the Liguanea Plain and the sea. A well-kept barrack-like building houses the children, while the cottages of the officials are grouped picturesquely on the wide-spreading lawn.

The school is well maintained, and the boys are taught trades. We were introduced to the Superintendent, Mr. W—, the sole survivor of the Morant Bay rebellion, of the time of Governor Eyre of "infamous memory." Later, as our neighbor, we learned from him the true story of the insurrection, and modified the opinions which, as right-thinking abolitionists, we had always held. But that will come in due order. Leaving the reformatory we drove homeward, stopping at "Fort George" as directed by Mr. W—. Well back from the road, from which it was completely hidden, and fully three hundred feet above, we found the cottage. The location of the estate on the verge of a steep acclivity commanding the whole lower world of hills, plain, and sea, made the name well chosen. A wealth of trees, shrubs, and creepers, formed the surroundings. Miss F—, the owner, an English lady, was willing to let the second story of her house with outside kitchen. We engaged the lodgings for £6 sterling a month, and the following day took possession.

Here my field-work went on uninterrupted for six weeks. A stroll through the grounds revealed a variety of small birds represented in numbers. There were many of our warblers present, passing the winter season. The black and white creeper, the parula, the Cape May, the black-throated blue and myrtle warblers, might constantly be seen. Swainson's and the worm-eating warbler, as well as the oven-bird and the two kinds of water-thrushes found in eastern North America, were all present. The redstart was abundant, as was the Maryland yellowthroat. A tiny white-eyed vireo peculiar to the island, and the black and yellow honey-creeper, a small blue tanager with a rufous patch on the throat called the "blue quit," and the mountain bullfinch or cashew-bird, were among the commoner tropical insular forms.

A small grass-green tody, with a vivid scarlet throat, reminded one of his near relative the king-fisher; all the characteristic movements were the same. Perched on a dead twig, only a motion of the head indicated attention. The swoop from the point of vantage and return to it with a luckless grasshopper or beetle were kingfisher-like in all details. Then the captured prey was beaten to death by the conspicuously large bill, and finally a backward toss of the head accompanied the swallowing of the morsel.

Like a house-wren in size, but with a shorter tail, the whole contour is that of a kingfisher in miniature, and the tiny glossy white eggs are laid in a Liliputian burrow excavated in some bank. Swallows were here, too. Home was recalled by the familiar denizens of bank and barn, but the Cuban cliff-swallow and the great blue swallow, as well as its golden ally, needed introduction.

Each day discovered new treasures, and the interest awakened by them more than compensated for any trivial annoyance caused by the difficulties of housekeeping. The domestic problems of Fort George were many and varied. Our apartment on the second floor was ample, comprising dining-room and drawing-room and three bedrooms. A jalousied gallery, twelve feet wide and some thirty-five in length, extended across the eastern front of the house, forming living and work room. The jalousies permitted the free ingress of the trade-wind, the beneficent "doctor" that every morning about ten o'clock comes to temper the tropical heat. The floors were of solid mahogany, hewn out by rude implements in slave days, with the polish given by a hundred years of constant use. The furniture was antique and hand-made, solid and cumbersome, as though built for giants—plainly the workmanship of the patient slave.

Our contract provided for a kitchen having an American cooking stove, as the landlady explained with pride; but this room we did not inspect on our first visit. Lacking experience in West Indian ways, Mrs. Scott assumed that the kitchen and its furnishings would serve our needs. We drove up from the hotel in leisurely fashion after luncheon, and having unpacked certain possessions, began to think of dinner. Mrs. Scott with her two maids, the cook, Margaret Douglas, and the butler, Letitia Pink, departed to take possession of the kitchen. The perturbed state of mind of the housewife responsible for the daily provisioning of a family may be imagined, when she found, on entering, a small room of closetlike dimensions, with dirt floor, rough and unkempt, one end slightly higher than the other, and on this mound of earth a tiny "American cooking stove," minus pipe, doors, covers, and legs, the only utensil a little "shetpon," or tin bucket. As there was no hope here, an alcohol stove was called into immediate requisition, and furnished the cup of chocolate which, with boiled eggs, bread and butter, composed our first dinner at Fort George.

Our landlady could do nothing; the kitchen answered her needs, why not ours? The next day we went in to Kingston, made the purchase of two coal oil stoves and the necessary pots and

pans. Light housekeeping then went on in fair fashion. Fruits and vegetables passed the garden gate constantly on the heads of the market women. Margaret Douglas was thoroughly trustworthy, and knowing how to deal in the small coins of the realm, "quatties," "tups," and "bits," made wonderful bargains, and kept us well supplied with "heggs," "pineapples," mangoes, "horanges," bananas, "honions," cabbages, bread-fruit, yams, and yampies. On market day Margaret went in to Kingston on foot and bought fresh meat, poultry, groceries, and came trudging back with her burden of eighty pounds poised on her head, happy and smiling, pleased with the sense of our confidence.

We had much amusement in our shopping, for it was at the chemist's that we purchased our milk, butter, cheese, potted meats, and preserves. To be sure, the milk was tinned, as was the butter, and the latter of the brand known as "Manteca de Goshen," highly recommended, but strongly suggesting axle-grease. Bread was poor, because the high import duties made it impossible to bring in good flour. The grade employed for bill-board paste in the United States is that in general use.

Mr. W——, our neighbor at the Reformatory, gave us a graphic description of the rebellion of 1865. When the court-house at Morant Bay was attacked by the blacks, he was struck down and

left for dead, but managed later to crawl away and hide in an outhouse till the rioting was past. But for the prompt intervention of Governor Eyre in proclaiming martial law and punishing the chief offenders, a general insurrection would have followed. The machete, a cutlass of rude design, was the weapon used by the blacks in their attack, for it is always at hand, and is their chief industrial implement.

Feeling ran high both in England and America at the time of the Jamaica outbreak. John Stuart Mill notably led in the protest against the policy of Governor Eyre, and in this country the abolitionists were at one in their sympathy for Gordon, whom they deemed a martyr. Ruskin, however, defended Governor Eyre, and it is now conceded by those who have had opportunity to study the question that he only did his duty.

Mr. W—— finds life very dreary here because of the social privations. Relations with the blacks are trying; one must not treat them with too great indulgence as they interpret this to mean fear. Some years ago Mr. W—— was employed as attorney for a Quaker firm in Portland, and they, wishing to act with great humanity, had toasted bread and coffee served to their employees on a cotton plantation every morning, and in other ways treated them with great consideration. As a result the negroes, thinking their owners were

trying to propitiate them, called their employers "buckra," white fools. The enterprise failed.

Apart from the officials at the reformatory, Bishop Nuttall's family, and one or two others, our neighbors were black people. Their small holdings were on every side. All about, the wattled huts perched on the steep hillsides, or huddled close together near the roadway. Even in our distant wanderings in the high woods we frequently came across a clearing, with its tiny patch of bananas and plantains, straggling coffee bushes, yams, and aki; over all the dense shade of a breadfruit or cotton tree. Nearly every cabin had its tame parrot, one of the green variety peculiar to the island, and a mocking-bird was often a member of the family. Fowls were not abundant, owing to the depredations of the mongoose, and the peasantry seldom own cattle or horses. Occasionally some one quite well to do possesses a diminutive donkey. Salt fish from the United States is the food most prized, meat is a rare luxury. Cocoanut oil is used for cooking. Cocoanut cream made from the fresh nuts still in the milk is delicious, but must be eaten just after the nut has been gathered. The various starchy vegetables make up the rest of the diet of the peasants, and upon it they seem to thrive.

Wages are low, judged by our standard. Butlers, cooks, and laundresses receive from ten shillings to

twelve shillings per month, in the country districts, and find themselves. The peasant women were uniformly courteous; as they passed us on the road or the woodland paths, they courtesied politely, and greeted me with "Mawnin', ole Massa," "Mawnin', my sweet lub," to my young friend and assistant. The men lacked graciousness for the most part; they are taciturn, and often sullen. In Kingston we met with numerous instances of their rudeness. It is said that they particularly dislike Americans.

One day Mrs. Scott and Mr. D—— were returning from Kingston by train, which was very crowded, they being the only white passengers. A black man seated behind Mrs. Scott leaned forward and placed his elbows on the back of her seat, much to her discomfort. She asked him politely to remove his arms, whereupon a portly brown man, immaculately dressed in white duck, of much self-importance, remarked that "if the American person is uncomfortable, she had better leave the car, the gentleman can do as he pleases with his elbows," etc. Mr. D—— cut short this tirade in a peremptory manner, the gentleman withdrew the offending elbows, but the muttered comments and surly looks of the other passengers showed us plainly that we were unwelcome intruders. One of the ordinances of Jamaica forbids a white man, under penalty of fine and imprisonment, to swear at a black man. The

frequent provocation must have led to the passage of the tantalizing law. The cabmen are insolent, the market women fly into a passion if a price is questioned. In the shops, when the negroes crowd against one rudely, there is no redress; a complaint to a black policeman is useless. All the minor officials everywhere, in post and telegraph stations, are of the same race. You must accept the fact that, as in Hayti, "the privileges of a white man are not numerous," and bear your novel position with due philosophy.

As I wished to study the faunal conditions in other sections, we secured through friends the lease of a place called Boston, at Priestman's River, in the extreme northeastern point of the island. The pen was an estate of eleven hundred acres. Our lease gave us in addition to the furnished house, linen and silver included, the use of two horses and a supply of milk. We did not undertake farming operations; they were still to go on under the direction of the head man, who was to keep us in wood. For this estate the rental was £10 sterling a month.

Having completed our negotiation by letter early in December, we began shortly to plan for our journey of some sixty miles, knowing that all details must be arranged well in advance. On the morning of December 22 we started. The drive to Annotta Bay was through a region of

wonderful beauty, the road firm and well graded, sweeping around a succession of curves, giving us constantly changing views of rugged mountains, and deep gorges through which dashed the Wag Water. Huge boulders lie in the bed of the stream; whirlpools, eddies, deep silent pools, the endless variations of a mountain torrent, delight our sight as our horses trot swiftly past. The banks are densely hung with fantastic creepers or shaded with the great plumes of the bamboo. At Castleton we stopped and walked about the Government Botanical Station, noted for its unrivalled collection of palms. The garden is on a hillside in a narrow valley; along the winding walks the plants are arranged for display of their finest features, combined either in picturesque groups, or, as in the case of some stately tree, growing quite apart. The tropical luxuriance here surpasses anything we have seen.

As we approached Annotta Bay our road came down from the hills into the flat lowlands,—long stretches of meadow over which many cattle were feeding. The Wag Water here spreads out into a broad, shallow stream. As we neared the sea we could hear the thundering of the surf, and soon came in sight of the great waves rolling in and breaking on the roadway. For a short distance we seemed below sea-level. Following along the coast we passed a succession of cocoa-

nut groves, pastures, banana plantations, the hills back at a considerable distance, showing their far-away tops in a mist of rain. We crossed several rivers on the new iron bridges just being completed by the enterprise of an American railroad company. Buff Bay was reached in the late afternoon. We had been directed to Miss D——'s lodging-house, which proved a shabby, one-storied cottage, approached by a flight of steep steps. Entering an untidy sitting room, we asked to see the bedrooms — they were not made up yet. Insisting that we must look at the rooms at once, we found them filled with people, dogs, and dirt, the air pervaded with the odor of castor-oil, the favorite hair pomade. At another tavern one clean room was discovered. Two tables, a sofa, and buffet made up the furniture. We decided to camp for the night at this place, as it was useless to look farther. Just as we had resigned ourselves to the inevitable, a card was sent in, and we were warmly greeted by Mr. Espeut, one of the large landowners of the neighborhood, whom I had met in Kingston. Mr. Espeut recognized me in passing, and realized our plight. Mrs. Espeut shortly joined him, and they urged us to spend the night at Spring Garden, their country place. The cordial invitation was finally accepted for the elder lady of the party, Mrs. J——. After their departure we made ourselves comfortable

with our rugs, and fared well on a cup of coffee, eggs, biscuit, and jam. In the early morning we drove on for breakfast at Spring Garden. It is a large estate, formerly a sugar plantation, the land now leased to the Boston Fruit Company for the culture of bananas. We spent a couple of hours with our kind host and hostess on the terrace, overlooking the sea, and then continued our journey.

Twice in the last four hundred years vast wealth has been concentrated in Jamaica, and twice this wealth has been dissipated. Both stories are interesting. When the "gentlemen of fortune" of all nationalities consorted in companies together and plied their vocation, the Spanish Main was the El Dorado they sought, and ultimately the city of Port Royal became the rendezvous of many of them—the haven of rest of the buccaneers. Here they lived in the most magnificent luxury, and here their orgies became so notorious that Port Royal was a synonym for the most wanton waste and wickedness of all kinds.

"On the 7th of June, 1692, the great earthquake occurred which almost destroyed the opulent city. Whole streets with their inhabitants were swallowed up by the opening of the earth, which, as it closed again, squeezed the people to death. Of the three thousand houses, but about two hundred, with Fort Charles, remained. The whole island felt the shock. Chains of hills were riven asunder; new channels formed for the rivers; mountains dissolved with a mighty crash, burying

alive the people of the adjacent valleys ; whole settlements sunk into the bowels of the earth, plantations were removed *en masse*.

"The sentence of desolation was thus, however, but partially fulfilled ; a noxious miasma, generated by the shoals of putrefying bodies that floated about in the harbor of Port Royal, or lay in heaps in the suburbs, slew thousands of the survivors."

Again, with the development of the sugar-cane industry, the island blossomed into fabulous prosperity. At the time of the abolition of the slave-trade, 1807, the proprietors were gleaning a harvest and amassing annual wealth that, if put in figures, would hardly seem credible. A single bi-product of the cane, rum, was alone worth many times the entire value of the present annual sugar crop.

With the emancipation of the slaves, and their purchase by the English Government, in 1833, began the decline of the second period in the fortunes of the island. About the same time one of the principal enemies of the sugar estates, the brown rat, was brought by ships from foreign ports. The depredations of this rat finally became so marked that on most estates it was conceded that a loss of about thirty per cent of the entire crop accrued from this source alone. Various remedies were sought to overcome the devastations so wrought, and sundry panaceas were tried to remedy the evil.

For two hundred years numerous suggestions have been made to mitigate the havoc caused by rats upon the cane crops of Jamaica, and rat-catching has always figured as an important item of expense on all sugar estates. The brown and black rats of Europe were, no doubt, introduced by ships, for they are common and occur generally. However, the rat which Gosse has described under the name of *Mus saccharivorus* is apparently a different species, and is distinguished by its lighter under parts and larger size, specimens often measuring from the tip of the nose to the tip of the tail as much as twenty inches. Ferrets were introduced, but proved inadequate; and it is hardly necessary to say that cats and dogs could not cope with the enemy.

At one time Sir Charles Price, an Englishman connected with the government of the island, conceived the idea of bringing from South America some species of weasel which he thought might prove efficacious, but his efforts were in vain. In 1762 it is said that Thomas Raffles introduced from the island of Cuba the native ants. These proved of some benefit, and are regarded by the sugar-planter of to-day as valuable allies. In 1844 Mr. Anthony Davis brought from South America a gigantic toad which had proved efficacious in the islands of Martinique and Barbadoes in destroying young rats. They had been

introduced there from Cayenne, where they abound in great numbers; but neither this toad nor the ant in question achieved the results that had been expected. As late as the year 1872 the rat pest continued as great a menace as ever.

To give an idea of the estimation in which the planters held the destructive powers of the sugar-cane rat, it may be stated that on large estates an annual expenditure of no less a sum than two hundred pounds sterling was set aside for rat-catching, poisons, and destruction of the vermin in various ways. It is not possible to estimate altogether the total annual loss caused by these vermin; but the consensus of opinion of the sugar growers seemed to be that it varied from twenty to thirty per cent of the entire crop.

As early as 1816 Lunan suggested the capabilities of the mongoose in these words:—

“There is in India an animal called mungoose, which bears a natural antipathy to rats. If this animal was introduced here it might extirpate the whole race of these noxious vermin.”

It remained for the gentleman with whom we were breakfasting to introduce a relentless enemy of the rat. William Bancroft Espeut, Esq., was a member of the Governor’s Council. I was especially glad to meet him, and to learn from his own lips how he brought the first of these animals to the island. Having made arrange-

ments to have them captured in their native home, India, and brought to this far-distant island, his efforts were successful in landing on his estate, in 1872, nine mongoose. He told me that four of these were males and five females. These he liberated at several different points, and the result was awaited with interest. The mongoose, an inveterate hunter of all kinds of eggs, is efficacious in India in ridding the country to a large extent of snakes; and as it is also equally sagacious in finding the young of most kinds of animals, its destructive powers can readily be imagined. The story of what the wily mongoose accomplished in the island of Jamaica in the short space of twenty years is well known to many, but I will briefly summarize it. From the nine animals introduced by Mr. Espeut there soon developed a numerous progeny. The balance of nature in any given locality is so well-adjusted that extreme preponderance of any given form of life seems to be held well in check by natural enemies in the struggle for existence; with the entrance into a new environment of any given organism, the conditions are probably often more favorable for its increase than in the region from which it has been taken, especially if this be a remote one, for obviously there are no natural enemies, it not being a concomitant part of the machinery of nature at that point. The mon-

goose did not offer an exception to this generalization.

Shortly before my visit to Jamaica these animals had increased to such prodigious numbers and their devastations had become so great that a Royal Commission was appointed to look into the matter. It will be sufficient for the purpose I have in view to say that the mongoose practically effected the purpose for which it was brought, namely, the destruction of the sugar-cane rat. But I have stated enough of the habits of this animal to make plain that with its increase in abundance other food supplies were necessary to furnish subsistence for the growing number. The eggs of ground-breeding birds, of lizards, snakes, as well as the young of all these animals, were preyed upon with some of the following results: ground-building birds, such as the quail and the guinea-fowl, exotic species, which had become feral in the island, as well as small insectivorous birds, many of the native ground-building doves and the like, were shortly either wholly exterminated or were much reduced. At the time of my visit to the island the quail had become extinct, the guinea-fowl was practically exterminated, all the snakes of the island had been annihilated, and as none of these were poisonous, so large an element of animal life taken from the whole began to show widely ramifying effects. Many species

of lizards had become very rare, and a number of them were wholly extirpated. Now all of these lizards were insect-feeding animals, and did their part to hold in check the throngs of insects which swarm in the tropics. The raising of all poultry was rendered well-nigh impossible, and even the young of animals like the pig and sheep suffered severely from the ravages of the mongoose.

One of the industries of the island of Jamaica was the raising of beef cattle, and the so-called pens on the islands, large cattle estates, had become famous in trade and story. Here were bred some of the finest cattle for supplying the markets of the neighboring islands, both for draught and market purposes. With the serious decline in bird and reptile life, resulting from the source I have indicated, there came a marked increase among certain insects that had always been regarded as great pests by the islanders. Chief among these was the grass-tick. This is a minute tick living in the grass fields; and with the destruction of its natural enemies, birds, lizards, and snakes, it multiplied and began to assume proportions that menaced the entire industry of cattle and sheep raising. More recently the destruction of this industry has been practically accomplished; for I have learned from those who passed last winter in the island that the raising of cattle and sheep had been abandoned at most

points wholly on account of the grass-tick. Even during the several months we spent on an estate, there were large grass fields, as attractive to the eye and with as luxuriant a growth as one could hope to see, which were not only shunned by the cattle, but into which they refused to be driven. Horses, as well as cattle and sheep, were the sufferers; so that it needs no little imagination on the part of the reader to conceive the endless consequences ensuing on the introduction of the mongoose.

It is only necessary to look at similar experiments made in various parts of the world to be aware of the inevitable evil results that follow. The naturalization of the rabbit in Australia and of the English sparrow in America are well known; and what they have accomplished in both regions has been summarized and set forth in detail by many writers. But even at their worst, no comparison can be made between them and the mongoose. It is probable that because this animal was brought into a small insular area that it achieved necessarily more deep-reaching effects than if it had been taken into the larger area of the mainland; for it is accepted that islands furnish protection to certain forms of life which have ceased to exist on the adjacent mainland, and conversely the opposite is true.

At the Spanish River our carriage was taken

in charge by eight stalwart black men, who, divested of clothing, swam across the stream supporting and floating the buggy by their united efforts. The horses swam under the guidance of other men, while we crossed on a narrow plank. The Spanish River, in native parlance, was "well down," we should say, up, rather; for swollen with recent rains it came in a torrent from the high mountains towering over our heads. At the Swift and Rio Grande rivers we had to seek similar aid, and most courteously was it given by the engineers in charge. Port Antonio, the metropolis of the north shore, with its fine harbor, we reached for a late luncheon. At that time only the usual native lodging-house offered accommodations, but now an admirable inn under the management of the American Fruit Company affords every comfort to the tourist. Delightfully situated on the high bluff overlooking the sea, the hills rising sharply in the background, topped by the glorious Blue Mountain peak, a more beautiful site for a winter resort is nowhere to be found.

We made good speed from Port Antonio to "Boston," over a road gaining in beauty as it wound in and out along the curving shore, close to the sea; now on the sands, again climbing a steep incline, protected by a solid stone rampart from a frowning precipice, or crossing a wide

savannah, in which the cattle browsed in grass up to their knees. As darkness fell we reached our destination. Satan, a huge mastiff, came out to meet us, accompanying Mr. H——, the factor of the property, whom the owner, Mr. J——, had left to see us properly installed. A host of dusky retainers lurked in the background.

The next morning we looked down on the deep blue Caribbean, three hundred feet below. A broad, undulating pasture lay in front, fringed on the shore by a grove of cocoanut trees. On the slope of the hill were groups of pimento, mango, and orange trees, with a few scattered palms. The house, a bungalow, was built close against the hill which rose abruptly behind it. A low stone wall formed a garden-enclosure, all overgrown with lycopodium, and surmounted by a *chevaux-de-frise* of the ping-wing, a spiked-leaved plant resembling the pineapple. Within, the crotons, poinsettias, and hibiscus furnished a wealth of color. The veranda was embowered in the fragrant bougainvillea; ferns of bewildering variety clung to every rock and cranny. When we learned there were five hundred species of the latter on the island we gave up seeking names for each kind. The rooms were large and well furnished. A grand piano and an organ lent dignity to the drawing-room, silver and china were unexceptionable; but all the luxury was

offset by the dismal black hole called the kitchen, with its rough stone floor and forlorn little American cooking stove, one, however, in which it was at least possible to build a fire. As we had by this time become accustomed to Jamaican ways of living, it was easier to surmount obstacles, and by dint of management our establishment was soon in good working order.

Every morning we were awakened by the plaintive call-notes of the various wild pigeons and doves that abounded. In the vicinity of the house the white-headed pigeon, the Zenaida or pea-dove, the white-winged dove, and the tiny ground-dove predominated. But we only had to go a short distance to encounter others. The ring-tailed pigeon, the game-bird *par excellence* of Jamaica, and ranked among the chief table delicacies of the island, was common in the deep forest. It seemed a bird of the high trees, as was the white-crowned pigeon, while the other kinds referred to frequent either open grounds or thickets. The ring-tailed pigeon exceeds in size the largest of our domesticated birds, and the white-crowned pigeon is in this respect about like a carrier. The white-bellied pigeon was to be found in the undergrowth of the forests, as were three quail-doves, the ruddy or mountain, the blue dove, or "mountain-witch," and the blue-headed quail-dove. The first of this trio was abundant, the others less

common, and all are singularly beautiful with iridescent color.

On the stretches of grass land, anis followed the cows and sheep, and in the trees just about the house mocking-birds, honey-creepers, tanagers of several kinds, cotton-tree sparrows, and white-winged orioles were always flitting about.

A large swift, locally known as the "ringed gowrie," was often present in great numbers late in the afternoon. They are fully three times the size of our chimney-swift, gray in color, relieved by a pure white collar about the neck. Generally they flew high in the air, but now and then I saw them skimming low over the meadows. Their flight is of great velocity, and the rapid evolutions characteristic of swifts are emphasized. In contrast is the diminutive palm-swift, much smaller, but in color like a chimney-swift, which I never saw far from its favorite cocoanut trees. The "gowrie" was never seen at rest, but the palm-swifts often alighted. Barn-owls flew like silent white ghosts low over the meadows in the moonlight, or perched in a tree near the house, crying like some lost soul. Nor have I named a tithe of the birds at "Boston"; for the ducks and grebes of the ponds in the pasture, for the denizens of the garden, and the songsters of the woodland a separate book is needed. A résumé of the birds may be found cited in the bibliography.

Having established relations with Mr. M—, the enterprising agent in Port Antonio of the American Fruit Company, we were able to get needed stores,—flour of good quality, butter, and bacon from the United States. Poultry, eggs, vegetables, fruit, coffee, the latter home cured, were supplied by higgler's at the door.

There is a monotony about tropical fare in a country district. Ice is wanting, butter and cream lack a proper consistency, and though the climate suggests cooling beverages, sherbets and other frozen compounds, one must adjust one's palate to a lukewarm temperature. Meat must be eaten before it is properly hung, and hence lacks savor; the same is true of poultry. Of our accustomed vegetables, we had potatoes and tomatoes; for the rest we found the chou-chou, which grew like the cocoa directly from the trunk of a tree, an admirable substitute for squash. The aki, suggestive of omelet, did not tempt us, one portion was said to be poisonous. Fruits there were in endless variety,—sweet-sop, sour-sop, star-apple, custard apple, sapodilla, avocado pear, mammee-sapota, mango, in addition to the familiar pineapple, orange, lime, shaddock, and cocoanut. The Number Eleven Mango is a fruit to be remembered, ranking, I fancy, with the famous durian of Borneo. Of the other unfamiliar fruits I can say little in praise; all save the avocado pear are

insipid, sweet, and sticky. This so-called pear is in reality a vegetable, and is excellent as a salad.

Numerous were the vassals and retainers of the pen that claimed service with us. We scarcely knew them all by name; but as their wages amounted to no more than that of one good servant at home, and they found themselves, we could not complain. In the early morning, when my work began, Diana, the housemaid, could always be seen shinning up a tree to gather wild oranges for cleaning the floors. This she did industriously, applying water strongly saturated with the acid juice of the sour orange, as a protection against insect pests. The mahogany floors shone under her vigorous polishing, the husk of a cocoanut making an excellent brush for the application of the wax.

I have mentioned that one of our perquisites at "Boston" was a supply of fresh milk; the amount was not stipulated in the lease, but as there was a goodly herd of cattle, we counted on once more having cow's milk and cream in abundance, as a welcome change from the tinned variety. The morning after our arrival we were awakened at dawn by wild shoutings and hallooing, the barking of dogs, and the noise of a rush of hoofed animals across the pasture lands. Jumping up, and looking out through the jalousies, I first thought a round-up was underway, the old famil-

iar Arizona scene was so vividly recalled. But I soon discovered that a cow and calf were being cut out of the herd, and driven at a gallop into a small enclosure at the foot of the hill. The cow, kicking and plunging, was tied by the horns to a fence-post, a negro standing on one side of the animal with upraised fence-rail, ready to give her a severe blow should she kick. Her calf was then allowed to go to her, but had no sooner begun to suck, than the poor little creature was pulled away by the tail, and a third man, at arm's length, a tin cup in hand, accomplished the milking. All through the process a hideous uproar prevailed, in which beasts, boys, and men joined. It was a laughable and, at the same time, a pitiful sight. Each cow yielding under these barbarous methods about a half pint, only three pints of milk was our daily portion. An elaborate cream separator and modern churn were in the dairy, and we had been assured that fresh butter could be furnished us in abundance. A few days later Mrs. Scott saw one of the maids squatting on her heels in the courtyard, lazily swinging back and forth in her hands a quart beer bottle containing a white liquid. "What are you doing, Diana?" "Meka butta cum, mum." And this was the source to which we must look for the coveted supply of fresh butter. A tablespoonful was the sole result of her lazy effort.

These *operabouffe* methods prevailed in all the farm and household operations. If wood was needed, a boy slowly departed to the forest, and returned dragging a branch behind him, and then, seated on his heels, hacked away with his machete, consuming two or three hours in providing fuel enough for the preparation of one meal. The washing went away each week on the head of the laundress, who carried the clothes to the nearest stream, and there pounded and hatchelled them on the flat rocks, standing often knee-deep in the water. It was not infrequent in crossing a river to see a line of these ebony creatures, clad in scant raiment, chattering and laughing over their work. How the ironing was accomplished remains a mystery. It was certainly of most indifferent quality.

Our table, however lacking in variety, was never in want of charming decorations. Sullivan, our butler, was a genius in producing artistic effects with maiden-hair, the fragrant sprays of stephanotis, the orange, hibiscus, and plumbago blossoms, or the many other flowers of rare beauty that grew just outside the door.

My work took up the greater part of each day; the mornings being largely devoted to collecting expeditions. During the preparation of material, when my hands only were busy, Mrs. Scott read aloud everything of interest we could find

relating to the West Indies and to Jamaican history in particular. Kingsley's "At Last" marvellously pictures the rare beauty and delight of a tropical winter, and though written of Trinidad, is alike descriptive of the other islands. "Tom Cringle's Log" gave us glimpses of the reckless, daredevil spirit that so long prevailed in West India waters. Gardiner's "History of Jamaica" sets forth in sober style the romantic story of the island, the scene of desperate deeds, the rendezvous of the pirate and the buccaneer; at one time the richest spot on the face of the earth, and the wickedest. Froude's later day journeying, with his comments and forecasts, was also of absorbing interest.

The event of the day was the arrival of King, a native hunter. While I was able, with the aid of my assistant, to get representatives of the birds of the neighborhood, the fastnesses of the deep woods and high mountains were left largely to the negro sportsmen familiar with them. William King, a giant black, a very savage in looks and breeding, was not only picturesque as a person, but was preëminent among the blacks as a hunter. He it was who generally appeared about dark, scarcely less interesting than the birds in his game-bag. He seemed always a wild creature fresh from the forest glade, who deigned to lend his aid in disclosing the mysteries of wood and

hill. His work was carried on in the most remote places, where he procured many gorgeous and wonderful birds. Besides the several kinds of parrots, the commoner pigeons and hawks, King brought "the old man bird," a very giant of cuckoos, the well-named "mountain-witch," most beautiful and rare of quail-doves, and the little solitaire, whose voice rivals in quality that of the most famous song-birds. King hunted, too, for the mysterious "blue mountain-duck," "the diabolitin," going to the summit of the towering peak in his search. His errand proved futile. Alas! for this petrel. Breeding in burrows it was an easy victim for the rapacious mongoose. A bird peculiar to Jamaica, and formerly abundant, it is now, so far as known, extinct.

The patois of the servants I found utterly unintelligible. As a housewife Mrs. Scott had to familiarize herself with the cockney English, the abbreviated sentences, the confusion of pronouns, and the Spanish idioms. Sullivan, entering, would announce, "Elli com, mum," which meant Alec (the house-boy) had come, or "boil water, mum," "mek bread, mum." I have boiled the water, I have made the bread. If anything is broken it is "all mush up." "Not too bad," "not too far" are answers to a question as to an injury or a distance.

"Nice fraish feesh jus gwine pas, sixpence a pound, sixpence a pound," a huckster's call, meant that nice fresh fish was offered. In this way all the various wares were cried.

"Cum buy-a-me-a feesh-a. Mek-a go way.

Mek-a go way. Mek-a go way.

Cum buy-a-me-a feesh-a. Mek-a go way.

Me no cum for to lean upon de counta.

"O de weda, O de heata, O de gingue,

O de gingue, O de gingue,

O de weda, O de heata, O de gingue.

Me no cum for to lean upon de counta."

This is a typical native jingle, drawled out in a sing-song monotone of minor cadence. The blacks of Jamaica present a contrast to their more musical brothers of America. Melody on the whole is not characteristic of the Jamaica negro. It is rarely heard. Once, however, a troop of men who were bringing a huge, half-finished canoe down from the high hills attracted my attention. Dragging the great weight on primitive rollers through the rough country, fifty or sixty stalwart fellows hauled on a rope, timing their efforts to a fine chorus in minor key.

An amusing incident serves to illustrate the customs of the peasantry. West, the head man, some thirty-five years old, came to me and asked if he could take two or three days as a holiday,

for his wedding. I looked surprised, as I knew West had a cabin full of children, from the veriest "pick'ny" to a well-grown lad of fifteen, and his wife seemed a particularly excellent woman. Was West about to abandon his family? Had a divorce been obtained? These speculations came to my mind. However, I gave the required permission, and then made cautious inquiry — learned that West, who had acquired some little property, felt that he could at last afford a wedding, and that he proposed to celebrate with proper ceremony his marriage to the woman who had been so long his faithful companion, the mother of his children. After the church service, the neighbors from far and near assembled at West's house. The merry-making continued for several days, and the good fortune of the happy pair was a source of rejoicing for the whole country-side. This practice very generally obtains. A man has no wedding till he can afford it.

At "Boston" we were in the black belt. Two bachelors were our only white neighbors. Our quiet was broken in upon most pleasantly by the visits of the officers of the historic *Kearsarge* and the *Enterprise*, while the ships were in harbor at Port Antonio. Professor Rothrock also stopped over with us on one of his botanical expeditions; he was that winter studying especially the forests of Jamaica.

Early in March we drove to Kingston, around the northeast end of the island, under the shadow of the John Crow mountains, following the picturesque undulations of the coast. Passing through the level lands of St. Thomas, we saw the many ruins of the former sugar estates, the decayed walls of mansions, now entirely overgrown with creepers, and the tumbled heaps of the once busy mills. All the territory is at present turned to banana culture, and is leased or owned by the Boston Fruit Company. Leaving the coast at Hectors River we drove inland, through constantly varying scenery, now along the bank of a rushing river, again crossing a wide savannah. At Bath, hidden away among the hills, a night was spent in a fairly comfortable lodging-house.

"Here are famous mineral springs both hot and cold, said to possess remarkable curative powers. The way to them lies along a narrow gorge, bordered with fern and moss and creepers covering the dark gray rock, and almost hiding from view the river rushing along below. Tree ferns spread abroad their arching fronds, and the air was fragrant and heavy with moisture, for it is a verdant hothouse of nature. From out the rocks above, tiny streamlets trickle across into the river beneath, some hot, some cold, and high over all nods the graceful bamboo, with its whispering leaves. A mile and a half of the enchanted road brings us to the Baths, which are wedged between the hillside and the river bank. The springs that supply them with hot and cold water bubble out of the rocks higher up, within a few feet of each other; the hot one at a temperature of 130° Fahrenheit."

Port Morant, where again the road touches the coast, is a busy shipping point for the Boston Fruit Company. Here we did not linger, but at Morant Bay, seven miles farther on, we visited the Court-house and square, the scene of the bloody riots of 1865, and heard once more the story of the Insurrection. Blue Mountain Peak is most impressive from the plaza, over which it seems to rise directly. We met Mr. Herbert Thomas, an inspector of the Jamaica Constabulary, who had given much time to an exploration of the mountain solitude, and who spoke with enthusiasm of his wanderings. A little pamphlet which he gave me called "Untrodden Jamaica" admirably describes the difficulties and delights of mountaineering in the island. My time and convenience did not permit me to reach the high altitudes. I was forced to decline the cordial invitation to stop with Mr. Fawcett, the director of the Botanical Gardens, and to visit him at Cinchona, his mountain home, where the flowers and fruits of England find a suitable environment. It is in this vicinity that the governor's family and other European residents enjoy a cool and delightful retreat in the summer months. The drive from Morant Bay to Kingston is through an arid country with dry river courses and parched vegetation, strongly reminding one of the southern slopes of the Santa Catalinas.

We spent several days in Kingston, and saw at the West Indian exhibition the wonderful natural products of the various islands, and noticed the scarcity of manufactured articles, save the most simple and primitive. Our only purchases were some artistic baskets made by the Caribs of St. Vincent. But one product overshadowed all others, and that was the distilled and fermented liquors, not only from the islands, but from Europe and the United States as well. Displayed conspicuously, with every variety of arrangement, offered in enticing form, all known kinds of whiskey, rum, brandy, cognac, and beer seemed represented. I marvelled to find any one sober. We made many pleasant acquaintances during our brief stay, and enjoyed the quaint hospitality of the inn, known as Park Lodge, with its clean beds and excellent Creole cuisine.

On our return to "Boston" immediate preparations began for our homeward journey, as we knew to our cost the endless delays and vexation of native methods. The beauty of the scenery, the quiet charm of the life so possessed us, that we left our feudal estate, our vassals and retainers, with many regrets. Who can paint the glory of land and sea that spread away at our feet, from the terrace at "Boston." Each day varied the outlook—an everchanging scene of life and color. Now the details appear in the backward vista.

To-day a tree close to the house stands out clearly. I see it in its wealth of golden blossom. Myriads of tiny black and gold birds clamber through the mass of bloom, searching every fold in each flower with their slender, pointed bills; they are the honey-creepers, the rivals of the humming-birds. To this same tree these jewels flock, and it is difficult to say if this emerald-green one with the exaggerated forked tail, the "doctor bird," or that amethystine creature of larger size, the "mango," or yet that golden dwarf, scarcely larger than a humblebee, is the greater marvel.

Look out to the sea and perhaps a water-spout towers from its surface toward the zenith. One afternoon during our stay, seven of these weird funnel-like towers of liquid proceeded in stately and slow procession down the coast, hidden finally by a distant headland. Among such neighbors the tropic bird, not at all awed, continued his aerial pilgrimage—a bird of grace in form and motion, whose blushing silvery coat contrasts with the jet-black feathers in wing and shoulder, and whose long attenuated tail seems a prodigal decoration to one already so well endowed.

As the time for leaving drew near, Mrs. Scott was beset by our black neighbors, who begged her to take a son or daughter to the United States. "Please, good kind missis, or please, dear sweet missis, do take my pick'ny." All ages and sizes

were offered, from the babe in arms to grown-up boys and girls. But when the day of sailing came, Diana McKenzie alone of the motley array of "pick'nies" accompanied us. In her native costume, with bare feet, short skirt, and gay plaid handkerchief worn as a turban, she was a picturesque figure. Of pure African type, smiling and gay, with her quaint bobbing courtesy, Diana was an unfailing source of entertainment to the passengers of the *Juniata*. Her sole possessions on sailing were wrapped in a handkerchief. After two years spent in this country, where she gave most excellent service, and became skilled as a cook, Diana returned to her own land. A large trunk was now needed for her wardrobe, a stylish cloth costume adorned her person, a hat with feathers had supplanted the turban, her feet were tightly encased in shoes, and she further was the proud possessor of a watch and a muff. Nor had she been a spendthrift, for she had in addition ten shining sovereigns. Homesickness alone took her away, and but a few months elapsed before she wrote begging us to send passage-money that she might come back to America.

Seven days was spent on the trip to Tampa, for we stopped at all the ports on the north shore of Jamaica to gather our store of bananas. In this way we saw Port Maria, St. Ann's Bay, Falmouth, Montego Bay, and Lucea. As we made our way

eastward, the lofty Blue Mountains faded slowly from our sight, and were succeeded by low hills and a rolling, pastoral country. It was on this coast, at Ora Cabessa, that Columbus in 1492 took possession of the island which he called Santiago, in the name of Ferdinand and Isabella. The native Indian name Xaymaca, modernized into Jamaica has, however, survived. At Lucea we finally weighed anchor and sailed northward to Florida.

On the 24th of March we sighted land, at eight o'clock were off Egmont Key, where the White Squadron lay, and a little later steamed into Port Tampa. At our old home, Tarpon Springs, we spent the month of April.

CHAPTER XIII

BIRD LIFE IN ENGLAND

IN the spring of 1900 I made a visit to the British Museum, London, and to the French Museum in Paris, to study some of the forms of birds found in southern South America. The expeditions, under the auspices of Princeton University, which had been sent to Patagonia to investigate the paleontology of that country, were not only eminently successful in that undertaking, but in addition, extensive collections of extant forms of animal and plant life were procured. Among the former were some eight hundred birds. The entire achievements of Mr. J. B. Hatcher and his aids were so notable as to warrant the publication of the results in detail. I was intrusted with the volume in this series which related to birds. This work took me to the great museums in London and Paris, for the early French voyagers had explored numerous points in Patagonia, Tierra del Fuego, and the Falkland Islands, and the illustrious Darwin had made a protracted stay in different parts of

South America, when attached to the *Beagle* in that ship's memorable "voyage round the world." Birds were brought back by all these expeditions, and among them were the types of many little-known species. It was to study all this material that my visit was made. It is not my purpose to discuss the results of this work here. The forthcoming monograph on the Birds of Patagonia will reveal the details to those who may be interested. The collections of birds in the British Museum of Natural History are more complete than in any of the other great institutions. While the exhibition collections are extensive, their great value lies in their educational influence. Here there is no attempt to make the details of classification a basis of the exhibits. No long files of effigies, closely packed together in crowded ranks, bewilder the visitor. Every known kind of bird from a given region is not displayed. A synopsis of the groups into which birds are divided is shown by a few characteristic forms from each of the divisions. The commoner English birds are arranged each in a natural setting, the motive being to show some salient feature of the economy of bird-life. Adaptability to environment, methods of nesting, conventional and exceptional protection by color or mimicry and other fundamental problems, are clearly and well set forth in this way. The label is not primarily to name the

bird, but to indicate something of the intricate life history that shall arrest the attention of the most casual visitor.

For those students who have gone seriously into the study of ornithology, an unrivalled collection of birds' skins exists. Here not only is practically every known bird, but the sexes, ages, individual variations, geographic variations, and the like factors are, wherever possible, exhibited in a large and adequate series of each. Such series often embrace a hundred individuals of a given kind or species. The aggregate of birds in the collection of this great museum is some five hundred thousand specimens. It is a great lexicon of the external appearance of birds, and is arranged and conducted on the lines of a reference library.

Nor is the interest in birds in England satisfied by a knowledge of names and relationships to one another. Wild birds of many kinds abound throughout the country districts, and the parks and gardens of every city afford congenial resorts for such birds as the thrush, the blackbird, the starling, and many more. I saw wood-pigeons breeding in the trees overhanging Piccadilly, where the hum of traffic never ceases, and where night is turned to day by countless electric and gas lights. Now and then I met magpies in Regent's Park, where they are well known to breed.

Passing through the country by rail one cannot but be struck with the multitude of birds at every turn. Starlings and lapwings are in every meadow, a colony of rooks on almost every farm, and waterhens in every little pond; the commoner small birds, robin-reddests, black-caps, yellowhammers, and chaffinches crowd the hedgerows, and with the thrushes and blackbirds produce a chorus of song whose volume is unrivalled.

Besides, so many people, rich and poor, have bird pets. There is scarcely a family without one. Canaries, linnets, starlings, blackcaps, thrushes, and blackbirds are among the more frequent sorts, but in the many private collections and aviaries the feathered treasures of all lands are gathered. India, Australia, Africa, and America, the East and West Indies, all contribute. Parrots of many kinds and hues have become so thoroughly acclimatized as to breed readily in confinement, and the delicate finches and weavers of Africa and Australia live and thrive in out-of-door aviaries the year round. The Avicultural Society is only one of a number of organizations which publish regular proceedings monthly devoted to live birds in confinement. Prizes and medals of award are conferred on successful breeders, and a keen interest is shown in the manifold original contributions to this and similar magazines. A

recent account of the breeding of the American catbird in an aviary will serve to indicate and emphasize the kind of interest manifested. Nowhere are wild or domesticated birds so much a part of the people's lives as in England.

CHAPTER XIV

THE NATURALIST'S VISION

IN the foregoing chapters it has been my endeavor to present a vista of the work and growth of a naturalist. To those who have followed the story, it will be apparent that the fundamental work, the skeleton, or frame on which the structure was reared, was the accumulation of collections of concrete things. In this case, these things happen to be birds. It seems important, however, to indicate how far-reaching is the instinct or passion for collecting. By no means confined to the human race, it is an attribute of the miser as well as the philanthropist. Surely no miser or collector of bric-à-brac is more assiduous than is the magpie in the same direction; and it is only necessary to have some comprehensive view of animal life in general to gain the knowledge that the passion of obtaining or possessing, crops out everywhere in the animal kingdom. It is not always clear what results may accrue from this instinct, what taste will develop, or what line of work follow collecting, whether this be postage-stamps, birds, or gold.

In this story I have not attempted to more than suggest the result in the case in question; but it is my purpose in this chapter to summarize it in some detail. I have related that, during a certain period, about 1884, when in Arizona, the opportunity was embraced to have a variety of different kinds of creatures as pets, and it does not seem essential even to recapitulate this. Following the narrative through the subsequent time passed in Florida, it is plain that, besides wild animals as pets, another factor commanded attention; for here animals were kept for *a definite object*. To study their growth and development, if nothing more, was my aim at that time. During the summer of 1895, through an accident, this interest began to assume more definite and concrete proportions. Late in June, while collecting one day, I killed a bird that flew by me. It passed rapidly, and I was not quite sure as to its exact identity. On taking it in my hand I found it was a female Baltimore oriole. Looking at the bird, I at once discovered that it probably had a nest in the vicinity, and that it was feeding young ones. By no means sure that the male bird would take upon himself the duties of both parents, I determined to look after the young, if the nest was not too difficult to find. This proved to be an easy task, for it was in the tree nearest me. There were three young birds

in the brood, just beginning to show the larger wing and tail feathers, but otherwise covered with down. They were not more than five or six days old. The nest and its inmates were carried to the house, and while I did not feel at all sure that it was possible to rear the tiny creatures, I determined to try the experiment. The fledglings were alike in size and appearance, and in order to have a record, in case it should prove of value, one of them was preserved in alcohol. The other two I attempted to rear by hand, and was entirely successful.

It is sufficient for my present purpose to say here that these birds were not only reared, but lived to be between five and six years old, and that they ultimately died, as I believe, of old age. Throughout their life they enjoyed as large an amount of liberty as was possible under the circumstances, and while they were confined at times to a cage, there was hardly a day during the first three years that they did not enjoy the liberty of flying about the rooms of the house. Later, when I determined from the interest that they awakened in me to utilize a room entirely for live birds, these two orioles were never confined in narrow quarters. In a paper recently published, and referred to in the appendix, I have set forth a record of the development of these two birds, and of their powers of song, so I shall

not attempt to elaborate the story again, but refer the reader to the paper there cited.

With the possession and study of these two Baltimore orioles there began a definite plan on my part to become more familiar with birds as *individuals*, and to that end to keep some of the commoner kinds of North American birds in confinement. When the orioles were about two years old, and I had become fully aware of the large field for investigation which they suggested, in the spring I collected a few live birds; a nest of blue jays, a nest of rose-breasted grosbeaks, and a nest of yellow-breasted chats, as well as an additional nest of Baltimore orioles; in all some fourteen or fifteen nestlings were the result of my efforts. At the time of this writing, August, 1902, a number of these birds are still alive, notably the blue jays, some of the grosbeaks and orioles.

From such a beginning gradually there has developed what may best be described as a *laboratory for the study of live birds*, and between four or five hundred individuals are now installed and under constant observation. These embrace many North American species, and in addition, European, Indian, and Australian forms, with some representatives from African and South American. All these birds are allowed as large an amount of liberty as circumstances permit,

though for certain kinds of observation and experiment the cage, with its limited area, is essential.

I wish briefly now to describe some of the more obvious problems which it is possible to investigate under such conditions as I have set forth. Chief among these I should place the opportunity to consider an animal as an *individual*. The fact that we do not consider wild animals as individuals is patent in our method of speaking of them. Our names for them are the names of groups of individuals that appear to us, on the whole, alike. We call them robins, wood-thrushes, bluebirds, and catbirds. This does not seem remarkable, because our point of view of foreigners of our own kind, human beings, emphasizes it. In looking at a large body of Chinamen, I think any one will fail, unless familiar with this race, to individualize them. The conventional idea of a Chinaman is of a race and not of individuals, and this comes about because of our *lack of opportunity to associate with Chinamen*. It is precisely the same with robins or bluebirds, catbirds or wood-thrushes.

A gentleman whom I had the pleasure of knowing, and who was extremely fond of horses and greatly interested in them, was so unfortunate as to be unable to live in the country where he might devote his time to the study of these ani-

mals. He was a runner or collector for one of the large banks in the lower part of New York, and his daily routine of work took him as far as 23d Street, every day over a regular beaten route. This occupation he pursued for some seven or eight years. He has assured me many times in conversation, that during that period he became so familiar with the horse population of the lower part of New York, that he individualized the horses and realized after a short time whenever he met a new one, and also missed one he had constantly seen, if it failed to appear. I think few of us go farther in the investigation of horses than to distinguish color; because when we have said brown, bay, chestnut, sorrel, gray, white, we have pretty nearly run our gamut. Small horses we call ponies, and another kind of grouping would be draught horses and driving horses. Farther than this very few people elaborate the individuality of horses. But here was a man, not of specially keen powers of observation, who had a great interest in this particular kind of animal, and who individualized them, at least as far as their appearance was concerned, so that they were to him no longer all kinds of colors or sizes, but became to him just as much personages as "Brown" and "Smith" are to the friends who know them. This is dwelt upon to emphasize the matter of individuality.

As a second suggestion, I believe that, with the knowledge of individuals (for example, if you become so conversant with a given number of robins — say fifteen or twenty — *as to know them by their faces*), you are in a position to be able to examine the nature and extent of variation of a kind that cannot be set down and formulated in measure of exact dimension. For many years a great deal of attention, care, and time has been given to detailed measurements of different parts of birds, as the wing, the beak, and the tail; but I am not aware that any one has given great consideration or has had the opportunity to give great consideration to the variation, for instance, in expression, carriage, or song of different individuals. Traits of character, still more subtle, which may best be described as mental, are, to say the least, difficult to become acquainted with in birds or other animals in a wild state.

It is true that naturalists and ornithologists understand pretty thoroughly that there is a correlation in color with the sex or age, or with the season of the year during which a kind of bird is observed, and I think that most of us are aware that there is a very wide variation in the intensity and shade of color in at least some kinds of birds which does not correlate apparently with any of these several factors. It seems obvious that whatever changes occur in appearance which correlate

with sex, or age, or season, can be recorded of the commoner species of birds when kept in as nearly natural condition as possible the year round.

It is not so easy to observe changes of another kind; but I suppose most people realize that birds as a whole, present in the tropics gayer colors than in the more northern regions; and probably realize that the birds of the desert and the birds of the region of perpetual snow have taken on a general shade of coloring closely assimilating with their environment. It does not seem at all impossible, given artificial conditions for producing an average temperature of greater or less degree, together with a definite amount of average humidity in the atmosphere, as well as a measurable supply of light, that any forms kept under such conditions might, and probably would, after a number of generations, show changes which we could conclude were largely due to such a new environment as had been artificially created. In short, it would not be impossible in a laboratory to draw conclusions and make observations as to what conditions produce certain results in color.

In speaking to an eminent ornithologist in England of the possibilities for observing birds in confinement, and whether it were worth while to go to the expense that would be thereby entailed, he suggested to me that, if we could

learn through such means the changes in appearance that were due to what is known as moulting,—the periodic shedding and replacing of the feathers of the coat,—this alone would more than compensate for the time, the labor, and the expense involved. It is an open question how much of the difference in appearance, which all of us realize occurs in birds at various seasons, is due to direct moult, how much is due to the wear of the feathers. The vexed question as to whether feathers themselves change color, with strenuous advocates *pro* and *con*, is still a bone of contention, and no one knows definitely of an experiment to settle the matter.

Animals of various kinds have been domesticated and bred in domestication or captivity for many generations of men; but I am not aware that there exists anywhere a record of just how the various breeders have brought about the results which are patent to any one at the present day. It is a question of economic value to know the steps necessary to pursue in order to evolve from a common ancestry by artificial selection, types of animals which, morphologically, at least, are as widely separated as the Percheron draught horse and the thoroughbred racer, or the carrier and fantail pigeon.

It is generally conceded that the various breeds of pigeons have been bred from a common stock,

the rock-pigeon of Europe; but what definite steps were taken, or what methods were pursued to obtain such divergent forms as fantails, tumblers, and carriers is not of record. Similarly, canary-birds have common progenitors attributed to them, so that their departure from the original type is very great, the breeds being as defined and marked as are the breeds of pigeons. What steps the breeders and fanciers took to achieve such ends is very obscure. It would seem that there is an underlying reason for all this. The successful breeder was loath to make public the methods pursued; because as long as he had a patent on a given kind of horse or bird, desirable in a commercial way, he was so much better off than the other breeders; and therefore, while many treatises have been written, and much has been discussed by breeders, more has been concealed, or at least allowed to go unrecorded.

So far the results of variation that breeders have obtained are represented by what are known as thoroughbreds; forms of life presenting at least external characters as definite as those upon which wild species are based. The adventitious aid of man appears to be essential, however, to the prolongation of any of the so-called thoroughbred types of domesticated animals, whether bird or beast. The moment that man's efforts are relaxed, and commingling of the various thoroughbred

forms is allowed, as, for instance, domesticated pigeons, the reversion to the common ancestral type is rapid and eventually complete.

Birds so widely separated in appearance as fantails and carrier pigeons breed readily together, and their offspring are fertile; and, on the other hand, birds so closely resembling one another as the hermit and the olive-backed thrush of eastern North America, which at points have the same breeding-range, appear never to interbreed, or, if such an event occurs, the offspring—the hybrids—do not perpetuate the new form so originated. All the foregoing is set forth in some detail in order to maintain the position that, while the efforts of man have produced wide divergences in thoroughbred forms of domesticated animals—types that any naturalist would consider as separate species if they were wild—they are only to be regarded as morphological species, and have no true physiological basis. The converse seems to be the rule among wild animals.

I am thoroughly of the opinion that a careful and prolonged effort, conducted under the proper conditions and with proper equipment, would result not only in the establishment of what I have termed morphological species, but that ultimately in a laboratory of the kind I have indicated, true, physiological species could be established; forms that would not revert to an ancestral type if left

to their own devices. At any rate, extended experiment of this kind would go far toward being an absolute demonstration of the mutability of species as set forth in the hypothesis of evolution by Charles Darwin.

The vista presented is certainly an alluring one, and vital problems await an answer. I have not touched on the factors of heredity; but I suggest to those who have battled in a war of words with Weissman,—a battle in which so much ink has been spilled,—that data can be obtained as to whether acquired characteristics are inherited. Also that much can be added to our knowledge in regard to prepotency, and that how great a factor telegony is, may be realized after prolonged experiment.

To be more explicit, I propose to ask a question, and to dwell on a method leading to its solution. It deals directly with one or another of these problems.

Do singing birds inherit the instinct of the method of song, or must that method be acquired by imitating the song of the parent? That passerine birds inherit a disposition to sing is obvious; but what of the method? Is the song of the robin as we hear it an inheritance or is it a matter of education? There are various theories propounded in answer to this query substantiated by hearsay, by probability, and by some partial

and inadequate experiments of neither prolonged or exhaustive character. Who has tried, or had the opportunity to try, to answer by demonstration the simple query propounded? Where is the detailed account given of a single definite experiment, or, better still, a series that should afford a necessary and final solution? And yet, of the many problems indicated, this is one of the simplest, the least complicated, and probably the easiest of solution and demonstration. How can it be done?

Conceive a laboratory containing, among other equipments, a series of sound-proof rooms. Take a nest of robins, say there are four in the family, let them be as young as possible. They are then blind and naked. It occurs to your mind as you read this how impracticable is the suggestion, how delicate the organism, how ephemeral the life! In answer I have only to say that in June, 1897, I took four nests of young robins and reared them by hand. From these I secured fourteen individuals; and as I am writing, late in June, 1902, they are all alive, and are vigorous, healthy birds. This morning as I left my bird-room a pair of them were raising, with great care, a brood of young ones.

Let us return to the consideration of the problem. Isolate the brood in one of the sound-proof rooms and rear the birds by hand so that they do not hear or see any other birds until they are at

least two years old. Do not suggest any method of song to them by whistling, or by singing, or playing on any instrument. We will now conclude that their habits are fixed, and whatever sounds they produce are at least not the outcome of imitating other birds. Record the results; and not being satisfied with this, bring other competent ornithologists to observe them and the end that has been attained.

Here, at least, is the beginning of an answer to the question. To carry it a step farther; associate a new brood of very young robins with the birds first raised. That is, put this second brood where they may hear and see what your first brood does, if anything, in the way of song, and the motions connected with it. Observe and record the results as with the original brood. Better still, and it is entirely possible, for, as I have indicated, under proper conditions even robins will breed in captivity, mate a pair of the hand-reared birds. You may observe what part inheritance or instinct plays in building nests of the conventional type; and at the same time, when the second brood arrives at the period of song, will they sing like wild robins, two generations away, or not?

Finally, if song is an inheritance,—that is, as far as its method is concerned (for I have no doubt that the disposition to sing is inherited in the group of song-birds),—let me present another

argument. It is well known that for upward of a century bird-fanciers have turned their attention among other matters to the breeding of hybrids. Bechstein, dealing with this subject as long ago as 1795, enumerates the following crosses with the canary-bird. He describes them all in much detail.

1. Canary-bird crossed with the European goldfinch.
2. Canary-bird crossed with the siskin.
3. Canary-bird crossed with the green finch.
4. Canary-bird crossed with the serin finch.
5. Canary-bird crossed with the linnet.

In addition, other authors have spoken of hybrids between canaries and nonpareils, canaries and bobolinks, as well as crosses between canaries and indigo-birds. Moreover, it does not seem improbable that crosses between canaries and various other finches might be obtained. But it is sufficient for the purpose we have in view to have emphasized the factor of hybridity as one of common occurrence, by the examples set forth above.

Now, the usual method of obtaining hybrids is to utilize as parents female canary-birds mated with the male of one of the foregoing kinds of birds, and the reasons for this is obvious, but perhaps worth elucidation. Through many generations of captivity the canary-bird has become

almost as thoroughly domesticated as are the various breeds of common fowls. At the present day the chief reasons for confinement of these little creatures is one of protection. Obviously their small size renders them an easy prey to other domestic animals, and were they allowed, in their innocence, the liberty, for instance, of chickens and dogs, I fancy the race, to say the least, would suffer. However, when confined in cages, canary-birds nest and breed at proper seasons whenever an opportunity is afforded. Besides, the canary is one of the few small birds of the passerine group that has been bred in captivity for a long period, so that they are no longer suspicious, do not resent intrusion, and readily allow their attendant to be familiar with them, even during that period of peculiar sensibility when the perpetuation of the species is the paramount passion. It is quite different with the various other birds enumerated, as having crossed with the canary; and, moreover, most fanciers have very largely confined their efforts with wild songsters, to males of the several kinds, because song is the principal attribute that has attracted fanciers to keeping birds in confinement. Even where both sexes sing, the males are easily the finer performers.

To follow my argument, it would seem that the crosses derived from the various parents sug-

gested, if the method of song were an inherited factor, would partake by prepotency of more of the quality of the song of one parent than of the other. Namely, given a canary and a goldfinch crossed some of these resulting offspring should inherit the characteristic song of the canary, while others ought, on the theory laid down, to sing like goldfinches; and this is applicable to the other crosses enumerated. At any rate, if a number of different broods were taken into consideration, it would appear that the matter of prepotency should produce at least some birds that would inherit the canary song.

Hybrids, as a matter of fact, appear to have the secondary sexual characteristic of song confined almost exclusively to the males; and so far as personal experience goes, I have yet to hear a male hybrid of the goldfinch and canary, the siskin and canary, or the linnet and canary, sing with any of the attributes of canaries; nor, so far as I am aware, do they possess the absolute song-method of the male parents, though their song greatly resembles it. I may say in conclusion that all the hybrids I have observed had canaries for female parents. This seems to me to indicate that the factors of propinquity and imitation are fundamental in establishing the method of song in at least this kind of young bird. Namely, given a young bird with an inherent power of

song, the method of expression of such a song is largely derived by hearing during its infancy the song of the male parent, it being nearer and more readily noticed.

I cannot but allude to the factor of adaptability, and its bearing on the domestication of animals. One reason, and perhaps the greatest one for our limited number of domesticated animals, is the lack of adaptability and plasticity together with that of docility among wild forms. Hence only those most readily dealt with have been utilized. It is probable that among the many kinds still untried valuable forms might be domesticated. Here is evidently one field of economic value. Another economic field has been developed among animals even lower than birds; so that it does not seem visionary to suggest the possibility of re-stocking some of the depopulated regions with native insectivorous birds in a similar manner to that in which the United States Fish Commission has succeeded in re-stocking, not only our inland waters, but also rivers and estuaries. Migratory fish, such as the shad and salmon, have been dealt with in this way; and their journeys away from their breeding grounds are quite as mysterious as those of birds, and perhaps less understood, if that were possible.

Instinct, habit, and the development of intelligence have been studied, but not continuously,

and, on the whole, in rather a desultory way. Alone, these problems present a field whose vastness psychologists appreciate.

What do we know of the leisure of animals? Do they have leisure, and how do they utilize it?

Finally, let us consider what may be termed opportunity. I have said that in the tentative establishment which I have fostered there are perhaps some five hundred birds. I had occasion the other day to show a friend of particular intelligence this collection. We commented on the beauty of color, the grace of form and movement, the alertness, and the æsthetic pleasure derived therefrom, and from song. We looked at the wood-thrushes, meadow-larks, song-sparrows and bluebirds, rose-breasted grosbeaks and orioles, at the weaver-birds and toucans, at the jays and plovers. In the breeding room a new brood of hybrids, which I then discovered for the first time, were of interest. They were crosses between the siskin of Europe and a canary. In other rooms we saw parroquets from Australia, macaws from South America, and the white cockatoo from New Guinea. The mina laughed and talked with us, the jackdaws watched us in a furtive way. The whole was entertaining—a busy scene of life! My friend seemed both amused and deeply interested, and so we left them. That night, coming home from some en-

tertainment, as we walked along my friend said to me: "It seems great work, but I do not exactly understand what you want to do with those macaws. What can you learn from them?" My answer was:—

"I don't know; but I do know that there is opportunity," and I related the following story.

Many years ago, on the night of October 19, 1880, I paid a long-delayed visit to Professor Charles A. Young. I was very busy as a field-naturalist in those days, and so thoroughly occupied that I had failed to take advantage of an opportunity which was within my reach. Shortly after I came to Princeton, Professor Young was called to the chair of astronomy, and a radical re-organization of the astronomical laboratories and observatories was undertaken. When the whole was completed under his direction, he was naturally proud of the facilities, and was anxious for the staff of the university to realize the excellence of the equipment. He had invited me many times, during an entire year, to visit the laboratory at night, but one thing after another prevented. However, I think the chief reason for my delay was that I did not appreciate that there was any special relation between the great science of astronomy and the problems of life and distribution which I was engaged in studying.

As I have said, I did finally pay the visit. I was received with great courtesy and shown all the apparatus and equipment, and finally many of the glories of the heavens were viewed through the new telescope; Jupiter with its moons, Saturn with its belt, and other marvels. When I was about leaving, somewhere in the neighborhood of nine o'clock, the full moon had just risen above the horizon. It attracted my attention, and I asked if I might look at it through the telescope. The desired view revealed a great silvery disk, looking to me perhaps some three or four feet across. On the glistening background the landscape, if so it might be called, of the moon became very apparent; but presently, as I watched, everything else was forgotten, as I saw an object which, at the great distance, seemed little larger than a fly, proceeding across the whole field of vision, silhouetted against the shining satellite. My sensations as I watched the spectacle are hardly to be described, for I knew I had seen, at least once, what had never been recorded before. I had seen a small song-bird flying at night. Other people had heard them, and I had heard them, but no one had recorded *seeing a song-bird fly at night.* I turned to Professor Young and asked him if he often saw birds in that way when he was observing the moon, and his answer was, "I have seen them for forty years."

Now, it is not necessary for me to state that here was an astronomer of eminence, and an ornithologist of varied experience, and up to that moment I do not believe that either of them (and I know one never had) apprehended that there was any connection whatever between the two sciences. Further inquiry elicited from Professor Young the fact that he did not realize that it was anything of consequence to see a bird fly at night; and moreover, he was not well enough acquainted with birds to be able to determine anything definite as to the special kinds observed.

I did not go away from the astronomical laboratory that night until I had seen many birds silhouetted on the background of the moon as they flew by, and before leaving I knew definitely that I had seen a number of birds of whose identity I was as sure as if they had passed close to me in broad daylight. I saw a barn-swallow, a goldfinch, a purple grackle, birds that I could refer to the family of sparrows, others to the family of wood-warblers, and at least two different species of woodpecker, one of which, I have no doubt, was the yellow-bellied sapsucker. I refer such of my readers as care for details, to a paper cited in the appendix, published on the subject, which sets forth the observations.

This is what I mean by opportunity; and I conceive that the possibility of observing things

which are not anticipated, is one of the greatest inducements for continued observation in any given field. While I am not sure in my mind of any specific reason for keeping certain birds, notably macaws, in captivity, I feel assured that the connection and the probability of events is greater ornithologically between macaws and the work of the ornithologist than is relationship between astronomy and migration.

Zoölogical study and investigation while carried on in many lines, has, up to the present time, consisted chiefly of three distinct kinds of work. Of these, the very fundamental matter of classification, which may be termed systematic work, is paramount. This includes, besides giving the names to the different forms of animal life and describing them, the grouping together of those related in aggregates known as genera, families, and orders. The second line of development in zoölogical research has been what may be termed morphological. It is true that systematic work deals somewhat with morphology, especially the obvious and external morphology; but the term morphology is largely associated with the investigation of the structure and appearance of the internal mechanism of animals. The third avenue of work is known as physiology, dealing with function, that is, what the various parts of the animal mechanism do in the economy of life.

The field in which I have endeavored to awaken interest by pointing out the way seems a fitting culmination of the others. Obviously, things must be named, and something of their relationship to one another known. Hence dictionaries; and I would liken such work as deals with structure and function in detail to grammar. The study of an individual, his acts, his deportment, his goings and comings, his amusements, his inheritance, his dispositions, his leisure, may be compared, taking the point of view that I have of the others, to a literature that it would be impossible to create without the fundamental basis afforded by the studies of the scholars who have made the dictionaries and grammars.

I wish it were in my power to picture with vividness, to give an impression of the conditions that obtain in my tentative laboratory. Imagine a room some twenty feet square, where over a hundred birds are enjoying liberty. Here are many robins, wood-thrushes, and bluebirds, the Baltimore and orchard oriole; bobolinks fly about as gayly as over the grass fields in spring. There are some eight or nine of these last-named birds, most of them males, and for two-thirds of the year, from January until late in August, their song is incessant. Here are thrushes from Europe and the starling that characterizes that region; a number of kinds of starlings from India,

and some babbling thrushes from that country. Meadow-larks form an entertaining group as they stroll about the floor examining with apparent curiosity and interest every blade of grass of the fresh turf supplied daily. Song-sparrows find congenial shelter in thickets, and blue jays, as well as green jays from Mexico, add to the vivacity of the scene. Cardinals and rose-breasted grosbeaks, as well as their relative, the blue grosbeak, are all represented. Mockingbirds, catbirds, and thrashers fly from one tree to another in the room (for it is large enough to have some six or eight small trees reaching from the floor to the ceiling) and seem to be as full of life and song and interest in affairs, as though out of doors. Here is a robin with a nest in the corner setting on her eggs, or a pair perhaps feeding young. In a calabash gourd at another point bluebirds find a place they like for breeding. It is a heterogeneous company, and the picture is at first confusing, both as to motion and sound. As one becomes accustomed to the scene, new details present themselves. A plover finds to his liking the vicinity of the shallow water-tank which serves as brook or pond for these birds, and rails peep out of the grass, or run nimbly from one tussock to another, pausing on the way to inspect the attractions of the feed dishes. Many of these birds have been in captivity for

six or seven years, notably robins, bluebirds, grosbeaks, and orioles; while the plover has been a member of this society for five years.

The student who carries on the kind of investigation here presented, should possess the attributes so ably set forth by Professor Gross in his book entitled "The Play of Animals." Speaking of the attainments that he conceived desirable in such a student, he says:—

"He must harbor in his breast not only two souls, but more. He must unite with a thorough training in physiology, psychology, and biology the experience of a traveller, the practical knowledge of a director of a zoölogical garden, and the outdoor lore of a forester. And even then he could not round up his labors satisfactorily unless he were familiar with the trend of modern æsthetics. Indeed, I consider this last point so important that I venture to affirm that none but a student of æsthetics is capable of writing the psychology of animals. If, in this statement, I seem to put myself forward as a student of æsthetics, I can only say that I hope for indulgence in view of the many shortcomings which are apparent in this effort" (speaking of his book) "on the ground that a versatility so comprehensive is unattainable by an ordinary mortal."

I can but echo the sentiments here laid down; the observer and student in this line of work is at

best but striving. Patience combined with some of the requirements spoken of above may accomplish much in *time*. Here I feel that I must call attention to this vital element in the solution of many of the problems. The consideration of time must be eliminated. The work must be continuous; the problem undertaken must be persevered in. The short period of an ordinary human life will prove inadequate to the completion. Such work should be laid down on lines so carefully considered, and so well provided for, that the experiment shall not depend on a single investigator, but rather on generations of investigators working to the same end. A properly equipped laboratory must therefore include, as one of its chief requisites, a staff of several investigators, preferably each of a different generation, so that the possibility of the interference with the continuity of experimentation shall be minimized. The performance must go on as advertised; it must be continuous; there must be under-studies; for the audience that awaits the production of results must not be disappointed. All this has been admirably stated by Professor C. O. Whitman in an essay dealing with the subject, and I find that the words he uses, "continuity and control," more adequately express what is desirable than any paraphrase.

I think I have expressed definitely what "continuity" means; "control" is more obvious. It

means that a laboratory for the kind of investigations that has been suggested shall have behind it a financial backing, regulated on business principles, so that an experiment once undertaken shall not be abandoned until the question involved is answered, *pro* or *con*.

I am not attempting to present a new idea; I am summarizing the conclusions of such men as Huxley, Darwin, Romanes, De Varigny, Morgan, Gadow, Poulton, and others. Perhaps I have formulated my suggestions in a more concrete way, because of the inspiring efforts of these workers to attain a like end. That is all.

But to what end must all work reach? Is it not the human element and interest that it bears upon? In closing I must again quote the prophetic words of Professor Gross:—

“ If the observations of animals is to be rendered fruitful for the unsolved problems of anthropology, an untried way must be entered upon; attention must be directed less to particular resemblances to man, and more to specific animal characteristics. Hereby a means may be found for the better understanding of the animal part in man than can be attained through the discussion of human examples alone. Man's animal nature reveals itself in instinctive acts, and the latest investigators tell us that man has at least as many instincts as the brutes have, though most of them have become

unrecognizable through the influence of education and tradition. Therefore an accurate knowledge of the animal world, where pure instinct is displayed, is indispensable in weighing the importance of inherited impulses in men."

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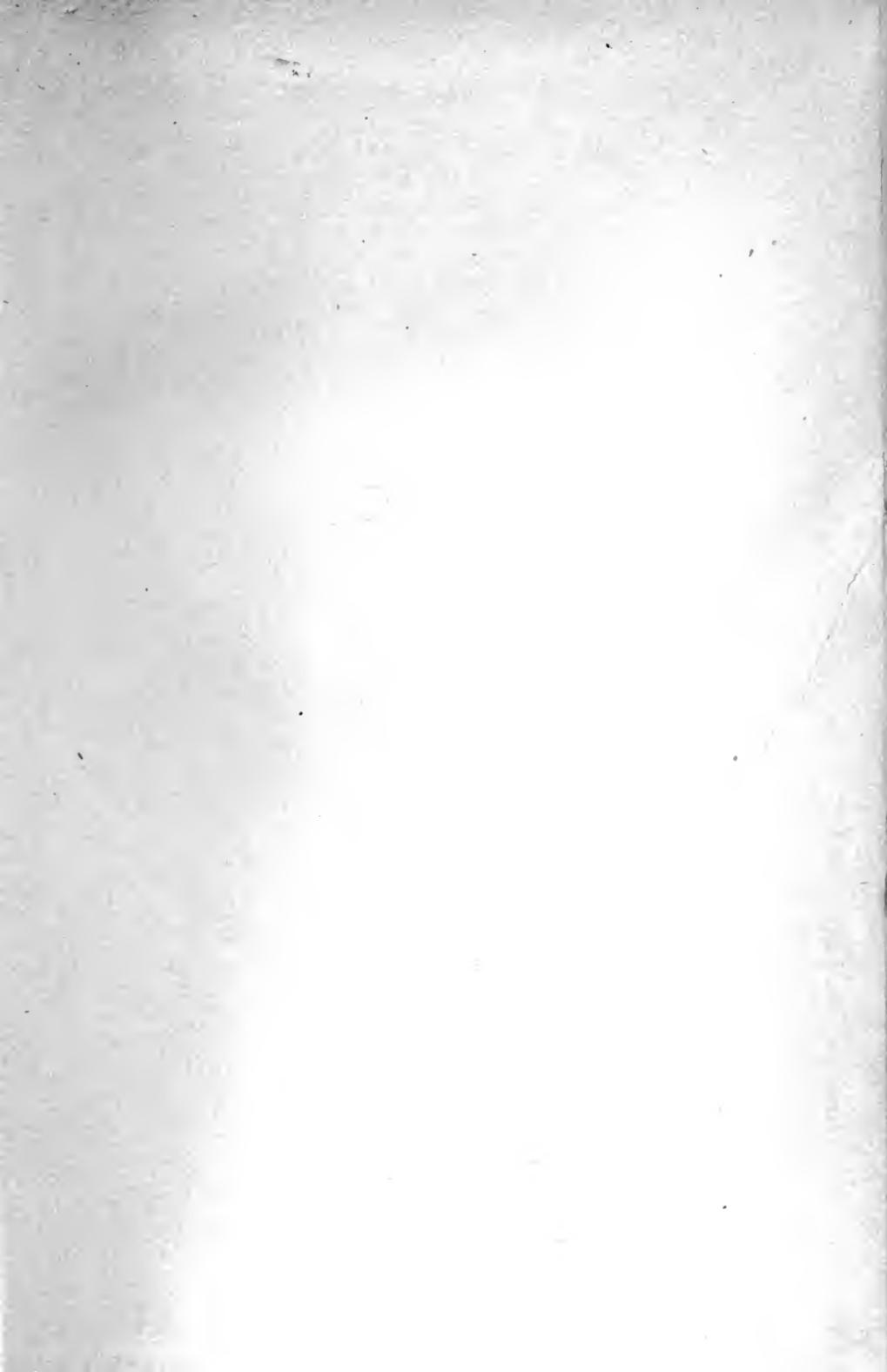
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